FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 107
No. 2247
Registered at the G.P.O. as a Newspaper

DECEMBER 31, 1959
Offices: John Adam House, John Adam St., London, W.C.2

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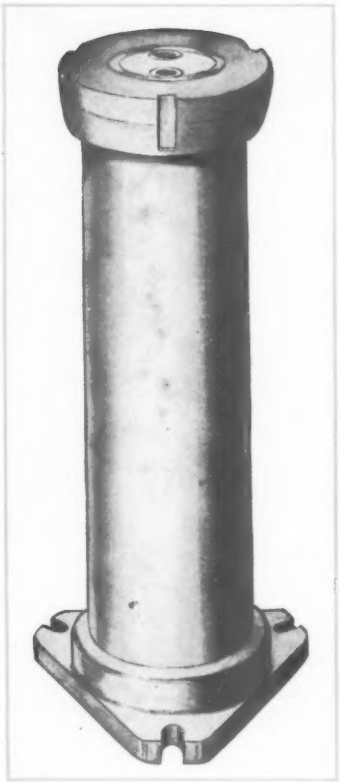

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Vol. 107. December 31, 1959 No. 2247

Established 1902

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IRON & STEEL TRADES JOURNAL

Single copy 1s.; *by post* 1s. 4d. *Annual subscription: home* 52s. *abroad* 60s. (*prepaid*)

Editor:
V. C. FAULKNER, F.R.S.A., HON.M.I.B.F.

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The FOUNDRY TRADE JOURNAL is the official organ of the British Steel Founders' Association; Association of Bronze & Brass Founders; the Light Metal Founders Association; Foundry Trades' Equipment & Supplies Association; and the National Society of Master Patternmakers.

AN INDUSTRIAL NEWSPAPERS PUBLICATION

Published Every Thursday by Industrial Newspapers, Limited

BARRINGTON HOOPER, C.B.E., *Chairman and Joint Managing Director*
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Telephone: Trafalgar 6171 (*Private Branch Exchange*)
Telegraphic Address: "Zacatecas, Rand, London"

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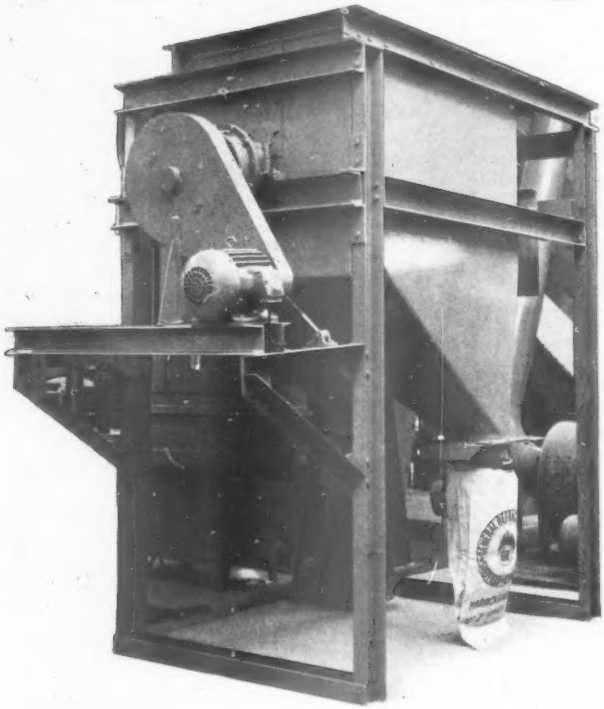

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FOUNDRY
TRADE JOURNAL
Vol. 107 DECEMBER 31, 1959 No. 2247

Fewer American Foundries*

The American journal, *Foundry*, reviewing the biennial publication of *Penton's Foundry List*, is of special interest. It discloses the shutting in the Americas, in two years, of no fewer than 235 foundries; 208 of these made grey-iron castings. This year there were 2,370 iron foundries listed, whilst 50 years ago there were 5,000 and, we would say, about the same proportion holds good for this country. The total number of American foundries is given as 6,085—a figure which refers to plants and not companies. The decline in numbers extends to steel foundries (if precision shops, where there is a gain, are excluded), aluminium, brass and bronze, as well as iron foundries, although gains have been shown in die-castings foundries and those engaged in magnesium castings production, the increase in number of the latter representing no less than 70 per cent.

The review includes a graph of current coremaking practice, from which it would seem that approximately 1,200 foundries are using the CO_2 Process for this purpose (760 for mould making); 750 are using self-curing cores and about 570 the shell process. Shell processes have gained appreciably on the North American Continent, and the CO_2 Process, not previously included in the statistics, is now used in 759 foundries for moulding and 1,283 for core-making. These foundry processes are set out in a graph, where " permanent mold " (that is, gravity-die) castings are separated from " die-castings " (that is, pressure-die-castings). The review also contains a note that the number of cupolas, open-hearths, converters, and air furnaces (reverberatory) is decreasing, whilst arc and induction furnaces, other reverberatory furnaces—probably a modern English type—and non-crucible furnaces are gaining.

Mr. Frank G. Steinebach, commenting editorially in *Foundry* on these statistics, wisely states " The trend towards a smaller number of foundries continues. Production statistics and information on new foundries and mechanization and modernization of existing plants show, however, that the production capacity of the foundry industry has not been effected by these losses. The industry probably is capable of producing a greater tonnage of castings yearly than at the end of World War II." We would add the comment that as gains are being shown in die-castings, precision and magnesium castings, that the value of the output is steadily increasing. There is plenty of life in the old dog yet!

* Statistics relating to UK iron foundries are recorded on pages 673 to 676 of this JOURNAL.

Durgapur Steelworks

President of India performs Opening Ceremony

On Tuesday, December 29, the President of India, Dr. Prasad inaugurated the first blast furnace at the Durgapur steelworks, in West Bengal. This works represents the largest single export order ever obtained by Great Britain. The contract, to the value of £105,000,000, is being carried out for Hindustan Steel, Limited, by the Indian Steelworks Construction Company Limited (ISCON), the consortium formed specially for the purpose. The ceremony celebrates the inauguration of an integrated steelworks and not just the completion of one blast-furnace. The coke ovens are complete with a coal washery, and by-products plant. The blast-furnace is complete with a gas-cleaning plant and pig-casting machine. The power plant is complete with all its standby units. In addition the central engineering maintenance department, foundry and stores department are very largely complete.

Durgapur is a joint Indian/British effort and approximately 50 per cent. of the capital expenditure and tonnage of raw materials has been supplied by India herself. Of the 33,000 labour force on the site, the vast majority are Indian; this includes a high proportion of skilled Indian supervisors. The number of British technicians working at Durgapur is, in fact, under 400.

In order to provide for the operation of the steelworks, 350 Indian technicians are being trained through the Colombo Plan in the United Kingdom. Others are being trained in Australia, the USA and other countries. In addition, the British Iron & Steel Federation have seconded technicians from this country to Hindustan Steel Limited, to assist in the initial operation of the steelworks and to complete the training of the Indian technicians.

The members of ISCON are 13 of the most famous firms in British industry. They are:—Davy and United Engineering Company, Limited; Head, Wrightson & Company, Limited; Simon-Carves, Limited; Wellman Smith Owen Engineering Corporation, Limited; Cementation Company, Limited; British Thomson-Houston Company, Limited; English Electric Company, Limited; General Electric Company, Limited; Metropolitan-Vickers Electrical Company, Limited; Sir William Arrol & Company, Limited; Cleveland Bridge & Engineering Company, Limited; Dorman, Long (Bridge & Engineering), Limited; and Joseph Parks & Son, Limited.

The Durgapur works also includes considerable facilities for foundrywork. Plans for these were outlined in the JOURNAL recently and details will be included in a future issue.

National Society of Master Patternmakers

A visit to the works at Trafford Park, Manchester, of Associated Electrical Industries (Manchester), Limited (formerly Metropolitan-Vickers Electrical Company, Limited) has been arranged for members of the National Society of Master Patternmakers to take place on January 19, 1960. The visit will be preceded by luncheon at 12 for 12.30 p.m., at the Princes Restaurant, Oxford Street, Manchester, the cost for the luncheon being 12s. 6d. per head. Since the number attending is to be restricted to 20, places will be allocated in order of receipt of applications, which should be sent not later than January 11 to the secretaries, Fisher & Firkins, 12, Cherry Street, Birmingham.

Forthcoming Events

JANUARY 5

Institute of Metals

Oxford local section:—"Brittle Fracture," by Prof. N. J. Petch, 7 p.m., at the Cadena Café, Cornmarket Street.

Institution of Plant Engineers

Edinburgh branch:—"Practice of Thermal Insulation," by Mr. Andrew and Mr. Angus George, 7 p.m., at 25 Charlotte Square.

Institute of Welding

Christmas lecture to young people—"The Magic Arc," by Professor Hugh O'Neill, at 54, Princes Gate, London, S.W.7. (Admission by ticket.)

JANUARY 5 to 7

Institution of Mechanical Engineers

Symposium on "Recent Mechanical Engineering Developments in Automatic Control." (Details from secretary.)

JANUARY 7

Leeds Metallurgical Society

"Modern Developments in Metallurgical Analysis," by K. M. Bills. (Details from secretary.)

Institute of British Foundrymen

Stoke-on-Trent section:—"Improvements in Surface Finish, Inspection and Fettling of Grey-iron Castings," by L. Clarke, 7.30 p.m., in the Stipendiary Court Room, Hanley Town Hall.

JANUARY 8

Institute of British Foundrymen

Tees-side branch:—"Ingot Moulds—A Critical Survey," by K. G. Harris, 7.30 p.m., in the Teesdale Hall, Head Wrightson & Company, Limited, Thornaby-on-Tees.

JANUARY 9

Institute of British Foundrymen

West Riding of Yorkshire branch:—Dinner/dance, 6.30 for 7 p.m., at the Midland Hotel, Bradford.
Scottish branch:—"Theory and Practice of Sand Slinging," by Robert Kennedy, 3 p.m., at the Royal College of Science and Technology, George Street, Glasgow.
Newcastle and district branch:—"Production of Aluminium Castings," by J. Vickers, 6 p.m., in the Neville Hall, Westgate Road, Newcastle-upon-Tyne.

Correspondence

"INSUFFICIENTLY-ADDRESSED" LETTERS

To the Managing Director,
Steel & Iron Foundry, Limited,
Covent Garden, London.

SIR,—Your 1959 calendar which was received at the beginning of the year, has been greatly admired by all that have had occasion to visit our office, some more frequently than others. If it is not asking too much, we would appreciate a copy of your 1960 calendar. Wishing you a very Happy Christmas and a Prosperous New Year.—Yours faithfully,

JOHN S. CARD.

CPO J. S. Card,
Submarine Escape Instructor,
4th Submarine Squadron,
Balmoral, Sydney, N.S.W.
Australia.

December 14, 1959.

* Quite a large number of "insufficiently-addressed" letters arriving at the Editorial office of this JOURNAL (which used to be in Covent Garden) can be diverted to their correct destination, but the one reproduced above "has us foxed"—to use an idiom believed to be quite customary in submarine activity. Thus through publication of the letter, the intended recipient is invited to reply. It would be a pity to disappoint our friends from "down under."—EDITOR.

Steelfoundry Practice

Proceedings of the Fifth Annual Conference of the British Steel Castings Research Association, last Autumn

Over 70 per cent. of the total membership was represented by more than 160 delegates to the British Steel Castings Research Association's fifth annual conference, the theme of which was "Steelfoundry Practice." The gathering took place at Harrogate late in October, and was held under the general chairmanship of Dr. R. Hunter, the chairman of the Association. The conference was divided into five technical sessions, a special feature being a film entitled "Some Continental Uses of the CO_2-Process" shown by Ing. Dr. C. Petrzela of the State Research Institute for Materials and Technology, Brno, Czechoslovakia. What follow are brief accounts of the general arrangements, extracts from the chairman's opening remarks and brief summaries of the papers presented.

The fifth annual conference of the British Steel Castings Research Association, held at the Hotel Majestic in Harrogate on October 22 and 23, dealt mainly with practical steelfoundry operating techniques. Details of the programme, extracts from the chairman's address, and synopses of the papers presented are given in what follows.

PROGRAMME DETAILS

On the morning of October 22, the conference opened with introductory remarks by Mr. R. Hunter, B.SC., PH.D. (chairman of the BSCRA Council). The conference chairman, E. Gregory, PH.D. (chairman, research committee), then gave his address (extracts from which are given later in this article). This was followed by a paper entitled "Features of the Association's Research Programme," given by A. H. Sully, PH.D. (director of research). After lunch, the chair at the first session —the theme of which was "Methods Control,"— was taken by Mr. F. Cousans (chairman, foundry practice advisory committee). Mr. R. Bygrave (Catton & Company, Limited) then presented his paper, "Operation and Value of a Foundry Methods Section," which was followed by a discussion. Afternoon tea was followed by session 2, on the theme of "New Developments," the chair being taken by Mr. H. W. Keeble (K. & L. Steelfounders & Engineers, Limited). The paper "Continental Uses of the CO_2 Process" was then given by Ing. Dr. Petrzela (State Research Institute for Materials and Technology, Brno, Czechoslovakia). Following the discussion on this, two further papers: "Air-hardening Bonds for Moulding Sands," by J. M. Middleton, A.MET., A.I.M., and F. Bownes, B.SC. (BSCRA), and "Mould Paints and Washes," by J. M. Middleton, A.MET., A.I.M., and P. G. McIlroy, B.SC. (BSCRA), were presented.

Friday, October 23, commenced with session 3, with Mr. C. H. Kain, M.I.MECH.E., F.I.M. (Lake & Elliot, Limited), in the chair, the theme being "Gating and Feeding". Mr. A. Pearson (Clyde Alloy Steel Company, Limited) presented the paper "Gating and Feeding of Small Steel Castings," and Mr. A. P. Riley (Darlington Forge, Limited) "Gating and Feeding of Large Steel Castings," both of which were discussed by the conference. Session 4, on the theme "Moulding," followed morning coffee, with Mr. S. L. Finch (Catton & Company, Limited) in the chair. The paper "Use and Abuse of Moulding Machines" by C. M. Stoch, DIPL. ING., and F. Bownes, B.SC. (BSCRA), was then given, followed by "Application of Sandslingers in Steelfoundries" by M. C. Lloyd, M.B.E., and W. L. Beasley (F. H. Lloyd & Company, Limited), both papers being discussed. The final session, following lunch, had the theme "Patternmaking," with Mr. G. Shaw, C.B.E., M.A. (W. Shaw & Company, Limited), in the chair. Mr. H. G. C. King (British Transport Commission, Crewe) then presented "Developments in Patternmaking." Following the discussion on this paper, the conference chairman wound up the proceedings.

CHAIRMAN'S ADDRESS

In the course of his opening remarks at the conference on the Thursday morning, Dr. R. Hunter, the chairman, said this was the fifth annual conference to be held and the first over which he had been privileged to preside, following his election to the chairmanship of the Council last July. After welcoming all present at the meeting, Dr. Hunter made special mention of Mr. C. H. Kain, who had acted as chairman at all the Association's previous conferences, and placed on record the members' deep appreciation of all that he had done over the past five years. Dr. Hunter also said how sorry he was that Mr. F. N. Lloyd, who was chairman of BSCRA from its birth until 1950. was unable to be present, and he also regretted that Dr. C. J. Dadswell, chairman of the British Steel Founders' Association, had at the last moment been prevented from attending.

The precedent established last year of inviting to the conference a distinguished guest from overseas had again been followed, and this time Dr. Hunter extended a warm welcome to Dr. L. Petrzela of the State Research Institute for Materials and Technology at Brno, Czechoslovakia. Dr. Petrzela was

Steelfoundry Practice

a pioneer of the CO_2 Process, Dr. Hunter said, and those present were looking forward very much to seeing his film. Dr. Hunter also made mention of the absence at the conference of Dr. E. Gregory, chairman of the Association's research committee, and suggested that good wishes be sent to him for a speedy recovery to full health. Next, the chairman welcomed Mr. W. S. Scott of Darlington Forge, Limited, who, at the Association's last Council meeting was elected vice-chairman.

Attendance at the conference was up to previous standards, Dr. Hunter said, the total number of participants being about 174. Turning to the programme of the conference, he said that, in addition to the lecture to be given by Dr. A. H. Sully and Dr. Petrzela's film, eight papers were to be presented and discussed. Five of these had been contributed by the industry which the Association served, and three by the Association's investigational staff. This blending of industrial experience with the publication of the results had been a regular, and much appreciated, feature of BSCRA conference programmes, as it ensured a balance between laboratory development and shop-floor practice.

Scope for Improvement

The percentage of the industry's total cost of production which was expended in costs directly allocated to the moulding and coreshops was probably of the order of 15 to 20 per cent., Dr. Hunter said, but the effects of error in foundry practice were, as everyone realized, very far-reaching, and caused wastage in melting, cleaning and dressing, heat-treatment and machining to the extent of perhaps many times the cost of moulding and coremaking. It was therefore pertinent at this conference, Dr. Hunter said, to consider how, by improvement of foundry methods, control and supervision, the industry's performance could be improved. These improvements would undoubtedly cost money, he said, but it should be remembered that a reduction in the level of scrap and rectification costs could result in quite considerable savings in the total cost of manufacture. He felt that many founders could benefit from increased supervision in the shops and development in their moulding and coremaking practice.

Dr. Hunter then went on to say that founders must also bear in mind their responsibility for improving the quality of castings. In collaboration with the British Steel Founders' Association, Dr. Hunter said that the BSCRA had recently established a steel-casting development committee whose function would be to provide and disseminate data to engineers and which it was hoped would result in an extension of the use of steel castings. Some of the difficulties confronting steelfounders in the development of additional markets related to criticisms from engineers in regard to price, quality and delivery of the industry's products. Dr. Hunter said that the industry's moulding and coremaking departments must take their fair share of responsibility for this state of affairs; quite clearly the activities of this new committee, which was addressing itself to present and potential customers, was going to be frustrated if those on the production side did not ensure that their products lived up to the enhanced reputation which this committee was seeking to establish.

An Important Contribution

The Research Association was formed to help the steelfounding industry to improve its technical standards, he added, and there was much evidence to suggest that it was now making an important contribution to this end. This was being achieved not only through its research programme, but by its advisory services, which were available to all members. At the Association's research station, a team of some 18 graduate investigators was engaged solely upon the problems of direct interest to steelfounders, and supported by a first-rate library and information service. With the additional financial backing recently secured from the Department of Scientific and Industrial Research, it was hoped to arrange for these senior members of the Association's staff to make more-regular visits to member foundries in the near future, Dr. Hunter said. Members would be kept informed of the latest results of research, and he urged members to take full advantage of the Association's facilities in helping to solve any problems they may have. It was only by the closest liaison between the Association and practical steelfounders that the fullest benefits could be achieved and expenditure on research justified.

With these remarks, Dr. Hunter said he had much pleasure in opening the conference and then called upon Dr. Sully, director of research, to present his lecture on "Features of the Association's Research Programme."*

SUMMARIES OF PAPERS

Summaries of the papers presented during the technical sessions are given in what follows.

Operation and Value of a Methods Section

By R. Bygrave (Catton and Company, Limited.)

In this contribution the author explained the organization and function of the methods section in the company with which he is associated:

Here, the duties of the section commence with the receipt of an enquiry. Each drawing is carefully perused, and any modifications to the design which are considered necessary in order to produce a sound casting are clearly marked, and the drawing subsequently returned to the customer. By this means the foundry-methods personnel maintain close liaison between the founder and customer, which contributes to the appreciation of the problems of both parties and invariably results in the establishment of co-operative relationships. (Simple examples of re-design which had produced a sounder casting, and which had simplified the work of the founder, were now cited in the Paper.) A

* Salient features of the current research programme were contained in the annual report of the Association, printed in this JOURNAL, October 8, 1959.

great amount of experimental work has been carried out by the section on gating and feeding of all types of castings, and the experience gained from these results is invaluable for eliminating casting defects such as sand and slag inclusions, etc.

Foundry Process Sheet

After deciding on the gating and feeding system, and which parts require chilling, etc., the complete method of manufacture is recorded on a foundry process sheet. A master isometric sketch is prepared for all castings to be made in the jobbing section, and a copy of it attached to the pattern prior to its being sent into the foundry. The positions of feeder-heads and runners are also painted on the pattern by the methods section, to give the moulder positive direction as to the method to be employed. Sample castings are made in many cases, and a complete record is kept of each sampling stage from the time the pattern is received to the time it passes through the final inspection stage. Should the sample casting be rejected then the method of manufacture is revised, the alterations being recorded and a second sample put in hand with the minimum of delay.

Close Control of all Processes

A constant watch is kept on all stages of manufacture, and here the co-operation of the shop foreman is essential in seeing that moulds are well rammed, cored up and closed correctly. An aid to avoiding confusion in the coreshop is the addition of dyes to the various sands, so that the coremaker can distinguish between them more easily. Methods-department personnel make frequent visits to the dressing shop in order to check any trouble that may arise there. All rejected castings are examined and analyzed by the methods section —in this manner the personnel of the department have at their fingertips a complete record of the history of all the castings the foundry has produced. Thus, the methods section is now the "nerve centre" of the foundry, and is constantly in touch with all the problems involved. (Concluding his paper, the author exhorted all foundrymen to establish their own methods department, so that the advantages described, *e.g.*, improved casting quality, simplification of production, etc., would benefit the steelfounding industry as a whole.)

Air-hardening Bonds for Moulding Sands

By J. M. Middleton, A.Met., A.I.M., and F. Bownes, B.Sc., L.I.M. (both of BSCRA)

Air-hardening bonds have been employed in foundries for a number of years, *e.g.* Portland cement in the Randupson process, as have various silicates and phosphates which give air-setting properties when mixed with sands. The main disadvantages of these binders is their poor breakdown properties after casting, and the fact that they air-harden slowly, which necessitates long periods of waiting before the moulds can be cast. Recently, however, several new organic binders have been developed that are suitable for either core or mould manufacture, since they are effective when clay is present in the mix, developing good green-strengths and retaining their air-hardening properties. (The properties of three such typical oils, all proprietary, are described in the Paper, including the green-strengths obtained with oil-bonded sands having various clay and natural-bonded-sand additions. The air-setting properties and baked strengths of oil/clay/sand mixes, and some indication of their bench "life" are also quoted.) Typical properties obtained with the addition of 3 per cent. oil, 3 per cent. clay and 0.1 per cent. accelerator are as follow:—green-strength 3 lb. per sq. in.; air-set compression strength after 24 hr. 330 lb. per sq. in., and a tensile strength when baked of 310 lb. per sq. in. The rate and volume of gas evolved during the breakdown of oil mixes after pouring may be higher than that from normal oil-sand mixes, and probably accounts for the blowhole defects sometimes encountered when using these special oil-binders.

Advantages and Disadvantages

(The foundry application of oil binders was now discussed, the binders being used in two ways: (*a*) as a binder in facing-sand mixes, and (*b*) as a spray (when suitably diluted) on the mould face.) Advantages claimed when using these binders are: Good "strip," especially with the higher-alloy steel castings; good dimensional accuracy; prevention of sand inclusions, and reduction of stoving and handling costs. Disadvantages are: The high cost of binders; the need for much closer control than with normally-bonded sands; sensitivity to variations in air temperature and humidity, and a possibly greater risk of blowhole defects in the castings.

Mould Paints and Washes

By J. M. Middleton, A.Met., A.I.M., and P. G. McIlroy, B.Sc. (both of BSCRA)

This paper describes an investigation into the properties of mould paints and washes for steel-foundry purposes:

Two main aspects of mould paints have been studied: (*a*) the room-temperature properties, and (*b*) the high-temperature properties. The room-temperature properties investigated were: the suspension properties, *i.e.*, the effectiveness of various types and amounts of suspending agents; the relationship between the paint consistency and specific gravity; the dry film thickness, and the extent of paint-sand penetration. The susceptibility of the paint film to cracking during drying, and the friability of the paint film when dried, have also been investigated. As a result of this work, it has been possible to arrive at formulations for suitable mould paints, *i.e.* paints which have suitable consistency and satisfactory suspension, which dry to give a hard film, and which are free from drying cracks. It has been shown that the susceptibility to cracking during drying, besides being related to the paint composition, is also affected by the condition of the underlying sand, *e.g.*, sand having a low

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ramming density or a low dry strength can give rise to cracks in the paint.

Use of Special Test Casting

High-temperature shock tests and metal dip tests were carried out on a series of paints, a novel form of test casting being employed in which high ferrostatic pressures were simulated by the application of compressed air to the solidifying casting. These tests showed that the composition of the underlying sand is important. If the sand does not crack when subjected to thermal shock heating, then a similar compact painted with a suitable mould wash will also show no visible cracking. It has also been found that if normal drying cracks are observed, then subjecting the painted sand surface to radiant heat may cause the paint film to spall away completely from the underlying sand. Only the higher refractory washes were effective in preventing metal penetration, whereas those washes which caused a sand/wash reaction were not. Thin coats of paint offered virtually no resistance to high ferrostatic pressures, but, providing the base sand and paint does not crack, a thick coating of a refractory paint gives a very high resistance to metal penetration. Paint formulations are suggested which can be applied as one coating to give very thick films free from cracks, and which have high resistance to metal penetration.

Gating and Feeding of Small Steel Castings

By A. Pearson (Clyde Alloy Steel Company, Limited.)

This was essentially a practical paper, in which the author illustrated a wide variety of methods of gating and feeding which are employed in the foundry with which he is associated:

Before considering specific examples of gating methods, the general principles that should be applied are surveyed. These are concerned with the positions where metal should be introduced into the mould, and the dimensions and design of the running systems, and their protection by refractory sleeves or tiles. The general rules adopted to give efficient feeding are described, and the sizes of heads to feed various sections, *e.g.*, flanges, rings, plates, bars, etc., are given. The use of exothermic aids to feeding is discussed, and it is suggested that exothermic powders are most suited for castings of fairly large mass having one or two feeder-heads, exothermic sleeves being more suited to castings with a number of smaller heads. Sleeves are also very efficient when they incorporate a knock-off core, since very hot steel is available within the head and the knock-off core is super-heated; this enables core apertures to be reduced below normal size. A large number of examples are given of methods of gating and risering used with a wide variety of castings. These include small shell-moulded castings in plain and high-alloy steels, and larger, very complicated castings, *e.g.*, pump casings which are subjected to high test pressures.

Premature Freezing-over

The author is of the opinion that many of the shrinkage defects found at corners, and at small cores remote from the feeder-heads, are due to premature freezing-over of the feeder-heads preventing the atmospheric pressure from operating on the head. By this means a partial vacuum is formed in the riser cavity—many mould conditions, *e.g.*, small cores and sharp corners of sand within the mould, can create local atmospheric cores where serious shrinkage may occur. The author overcame this kind of defect by inserting true atmospheric cores in all heads, even open ones, the cores being placed horizontally and at a distance of approximately two thirds up the feeder-head.

Gating and Feeding of Large Steel Castings

By A. P. Riley (Darlington Forge, Limited.)

The author does not purport to lay down a set of rules for the gating and feeding of large steel castings, but rather to draw attention to certain facts, and to mention certain changes that can be made to improve soundness and freedom from defects. These changes include improvement in design and additional aids to natural atmospheric gravity feeding:

Certain vital factors must be borne in mind when considering the production of large castings. Amongst these is the high cost of moulding when compared with that of the molten steel. The risks entailed in the production are large—small savings in moulding time, or skimping of moulding materials, can easily result in a scrapped casting or danger to personnel. Most heavy castings have heavy duties to perform, and should be as sound as human ingenuity can make them. Downgates are usually standard, speed of pouring being determined by the number of downgates and the ladle nozzle size. Modern moulding materials are such that they will withstand much more "wash" than hitherto—as a result, top running can quite often be used, with greatly improved results as regards feeding. As a general rule, the slower the casting is poured, the better, as quick pouring almost always results in certain defects being produced.

Feeder Heads

The factors which govern the positioning of feeder heads are discussed, *e.g.*, feeder heads must be positioned to allow easy moulding, and must not hinder the contraction of the casting. The casting must be moulded so that heavier sections are at the top, and the heads positioned so that they can be easily removed by burning, etc. A number of examples are given of the percentage of feed metal required for castings of various designs. This can vary enormously with the type of casting, compact solid pieces or symmetrical thin-section castings generally requiring a lower percentage of feeder metal. The various aids to natural feeding are also described. Natural atmospheric heads suitably kept open by various means,

e.g., rod feeding, and the addition of insulating and mildly exothermic materials are preferable, and are the simplest to use. Other additional feeding aids are: after-feed heats, electric-arc feeding, and exothermic metal additive compound additions. After-feed heats are probably the most effective, exothermic sleeves being limited since they cannot be used on very large heads. Exothermic metal formed powders are better than sleeves, since they can be added at timed intervals, but they too have certain disadvantages. Electric-arc feeding is an ideal method for feeding compact pieces, but on complex castings practical considerations restrict its use.

Use and Abuse of Moulding Machines

By C. M. Stoch, Dipl. Ing., F.I.M., and F. Bownes, B.Sc., L.I.M. (both of BSCRA)

This paper is based on experimental work carried out by BSCRA in investigating the two main factors which affect the quality and consistency of machine-made moulds, namely, the compaction characteristics of the moulding machines, and the properties of the moulding materials:

It is often observed, when examining castings and machine-made moulds, that the defects encountered are associated with the non-uniform compaction of moulding sand. Therefore, special attention has been given in the work to measurement of mould hardness, etc., in those places which are difficult to compact. The uniformity of compaction is more important than just a local high hardness. Unfortunately, however, some parts of the mould have to be compacted excessively, so that other parts reach some degree at least of compaction (although this is often inadequate). Jolt/squeeze, and shockless simultaneous jolt/squeeze, moulding-machines have been tested under closely controlled conditions, using a simple block pattern. Mould-hardness and density surveys were carried out to determine the degree and uniformity of compaction. A simple trace-plotting device has been developed for determining the frequency and length of the jolt stroke, and the effect of such variables as table load, air-line pressure on the jolt stroke, and frequency determined. The results obtained emphasize the importance of keeping within the rated capacity of the machine and maintaining a high air-line pressure, if deleterious effects on the compaction of the moulds are to be avoided. Rather low mould-hardness figures were obtained by squeeze alone, although some improvement resulted from the use of profile squeeze heads. Best results were obtained with jolt plus squeeze, but the air-line pressure still has a marked effect on the efficiency of operation of the machine, and upon mould compaction.

Other Essentials

The influence on compaction of such variations in the moulding mix as: moisture content, green-strength, and aeration, was investigated. It was found that the degree of compaction is fairly independent of the properties of a given moulding mix, but that the use of a high-green-strength, lumpy sand can cause very serious defects in the mould. The effects of very high squeeze pressures have also been studied, a much greater degree of hardness being obtained with high-green-strength flowable mixes than with the more orthodox mix. (Practical methods of applying high squeeze pressures are now described in the original paper, and the advantages and disadvantages of diaphragm moulding, as evidenced by published information and observations made by the Association, discussed.) Regular and systematic inspection and maintenance of moulding machines is essential. Often, insufficient attention is paid to ensuring an adequate supply of air, at a sufficiently high air-line pressure, to the machine. In certain foundries, cut-off valves are fitted in the air-line to each machine so that no mould can be made when a machine is operating at less-than-optimum air-supply conditions.

Application of Sandslingers in Steel Foundries

By M. C. Lloyd, M.B.E., and W. L. Beasley (F. H. Lloyd and Company, Limited.)

The main advantages of sand-slinging are: uniformity of ramming density throughout the mould, with virtually no loss of hardness at vertical pattern faces; substantial savings in time and labour as compared with hand-ramming methods, and the fact that the Sandslinger can be applied to either jobbing or repetition work with equal success. The F. H. Lloyd organization operate a total of nine 'slingers in their three foundries. These include four American Speedslingers, two German Speed-slingers, and three British Sandslingers. "Speed-slingers" are machines where the operator guides the machine whilst sitting on the slinger head, while "Sandslingers" are those manually controlled by the operator standing on the floor. "Speed-slingers" are capable of ramming roughly twice the volume of sand per min. over nearly twice the radius of coverage, as compared with the "Sand-slinger" capacity.

(Comparisons are made between the American and German machines and an early British mobile Sandslinger, which is now obsolete, as regards ramming capacity, area covered, impeller drive, head size, peripheral speed, cost, etc.). The first American Speedslinger was installed in the author's foundry in 1951, and the high opinions held of this machine were fully justified. In fact, production times were considerably reduced, and the moulders were able to increase their average incentive earnings.

Extensive Foundry Alterations

The introduction of the Speedslinger opened the door to quite extensive and radical alteration of foundry methods on certain standard repetition lines. Split patterns mounted on accurately-jigged patternplates were introduced, and mounted patterns are now used for a wide range of quantity jobs, of which the biggest is a 7-ton casting in a 19- by 8-ft. box. A second machine has been installed in this foundry, and two further machines

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in other foundries within the organization—all these Speedslingers have performed with consistent reliability and success, and are easy to maintain. Due to the substantial increase in mould production, core production became the foundry's bottle-neck. This was overcome by the introduction of a layout employing three stationary Sandslingers as the ramming machinery. The saving of ramming time solely as a result of the Sandslinger amounts to 44 per cent., while the total saving—in ramming, stripping, and finishing—is 31 per cent. Recently, a section of the foundry which was originally occupied on the production of repetition moulds on jolt/rollover machines has been converted to a rollover machine incorporating Speedslinging. This machine employs two German slingers, the moulds traversing a circuit made up of several stations, each of which constitutes a definite part of the production cycle. The operation of the plant has been subjected to intensive work study in order to eliminate all operational bottle-necks and delays, and to provide a sound basis for the installation of comprehensive incentive schemes to increase production and lower costs.

Introduction to Patternmaking in Plastics

By H. G. C. King (British Railways, Crewe)

This paper is based largely on accounts which the author has presented to meetings of the IBF and the National Society of Master Patternmakers.*

The author describes the production of patterns in plastics as carried out in the patternshop which serves the foundries of the Crewe locomotive works, and states that such patterns, in use on jolt/squeeze machines, have produced many thousands of high-quality moulds without needing repair. The types of materials (resins, fillers, hardening and release agents, etc.) required for the manufacture of the patterns are described, as is also the necessary equipment for mixing, casting and drying. A detailed description is given of each stage of manufacture of a plaster pattern, starting with the preparation of the master pattern and production of plaster moulds. The patterns may then be made by either solid-casting, shell-casting with a preformed core, or with fibreglass laminates. Full details are given of each process, including the mixes to be used, and the method of application. Pattern repairs are said to be comparatively simple, using a putty for rebuilding broken parts or a cream for repairing shallow surface damage. In conclusion, the author stresses the immense possibilities of plastics for patternmaking. Whilst they are more expensive than wooden patterns, he states, they offer many advantages, one of which is superior finish, which gives improved flow of sand over the plastic surface and allows easier stripping from the mould. Furthermore, he concludes, exposure to varying atmospheric conditions during use and storage, and the use of warm and damp sand base, have no effect on the patterns.

* For example "Plastic Patterns," a meeting reported in the JOURNAL, October 8, 1959.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

810,555 Thomas Reynolds, Little Harrowden, near Wellingborough, Hants.

Improvements relating to apparatus for clamping together parts to be joined—such as in the closing and welding together of shell moulds. This invention has for its objective an apparatus which will apply constant pressure over the whole of the mould surface, give a quick, simple, and ready means of closing the mould, and give an equal pressure at predetermined positions over the mould surface.

810,653 Continuous Casting Company, Limited, 17, Victoria Street, London, S.W.1.

This Patent relates to containers for mould metal, *e.g.*, ladles and tun dishes, used for casting. It is particularly, but not exclusively, applicable to the use of such containers in continuous-casting processes.

810,988 Harborough Construction Company, Limited, Harbilt Works, Market Harborough, Leics.

Sand mixtures consisting essentially of silica sand and drying oils for foundry moulds and cores. This company claims the inclusion of an accelerating agent. This consists of or comprises potassium permanganate, which is included to hasten the rate of hardening of the mixture when moulded. It may also consist of a dry powdered mixture of potassium permanganate with a clay or equivalent diluent.

811,197. Karl Schmidt, G.m.b.H., 10, Fabrikstrasse, Neckarsulm, Wurttemberg, Germany.

Ingots or similar shaped objects adapted to be stacked and conveyed by means of lifting and handling equipment—such as fork-lift trucks—without requiring to be secured by special means such as bands and supports to prevent the stack from collapsing. Essentially, the present invention claims the use of pyramidal-shaped teeth along the shorter edges of the castings—an odd number on one edge and an even number on the other. Generally one tooth on one side and two on the other are sufficient. (See also B.P. 754,177.)

811,476. H. F. Ebenhard Backstrom, Kauppakatu, 9 C 26, Tammerfors, Finland.

Apparatus for the manipulation of moulding patterns and boxes during moulding operations, which is supported by a crane. It is one of the principal objects of this invention to provide an improved apparatus which will be able to cope with different-size moulding boxes.

811,630. Harborough Construction Company, Limited, Harbilt Works, Market Harborough, Leics.

Production of a moulding mixture of sand and drying oil for foundry mould- and core-making. An accelerating agent is included which consists of suitable metallic napthenates, linoleates and/or rosinates (such as white spirit) in order to hasten the rate of hardening of the mixture when moulded.

811,805. Juenkerather Gewerkschaft, Juenkerath, Rheinland, Germany.

A method of moulding and hardening cores in which the hardening medium is passed into the sand through a perforated bladder. Carbon dioxide, compressed air, core-hardening oil and hot air, are all claimed as pressure media.

Future of Ironfounding

Abstract from the IBF Edward Williams Lecture given by Sir Frederick Scopes*

It is appropriate at the end of the year to consider the state of the industry and its prospects for the future. In this connection—as far as ironfounding is concerned—the 1959 Edward Williams lecture is extremely pertinent. What follows is an abstract from Sir Frederick Scopes' remarks when he gave the lecture and some of the statistics he reported. Since the date these were quoted, the industry has been much encouraged by a considerable upsurge in business in nearly all areas, and events thus seem to be moving towards substantiation of the lecturer's prediction of a brighter future for ironfounding.

In his Edward Williams Lecture, Sir Frederick Scopes, who had taken for his subject "thoughts on the future of the ironfounding industry," based most of his remarks on a number of tables of statistics which had been handed round to the members assembled (some of which are reproduced in Fig. 1 and Tables 1 to 6, the statistics reported being largely self-explanatory†).

Bright Future for Ironfounding

Initially, Sir Frederick mentioned that originally he had been invited to give the lecture two years ago, but circumstances had intervened and it was now pleasing to record that the future for the iron-

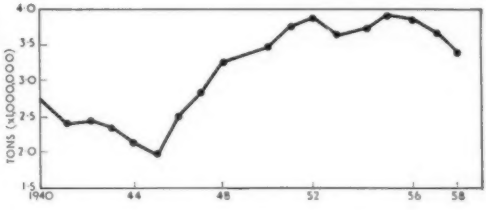


FIG. 1.—*Graph showing the total output of iron castings in the UK from* 1940 *to* 1958.

TABLE 1.—*UK Ironfounding Establishments classified according to Numbers Employed.*

Persons employed	Number of establishments			Number of establishments as a percentage of total number of establishments.		
	June, 1957.	June, 1958.	End of 1958.	June, 1957.	June, 1958.	End of 1958.
0– 10	321	342	308	19	20	19
11– 25	377	377	386	22	23	24
26– 50	370	352	330	22	21	21
51– 75	196	188	183	12	13	12
76–100	103	86	91	6	5	6
101–300	241	225	218	14	13	14
Over 300	82	78	67	5	5	4
Total	1,690	1,648	1,583	100	100	100

From the above it can be seen that approximately two out of five firms employ under 25 persons; two out of three employ under 50; and three out of four employ under 75. Only one firm in five employs over 100 workers. One-fifth of the firms produce three-quarters of the output.

TABLE 2.—*Percent Change in Total Production of Iron Castings from* 1949 *to* 1958.

Castings in grey and malleable iron.	1949.	1958.	Change.
	Tons (× 1,000).	Tons (× 1,000).	(Per cent.).
Automobile (tractors, cars, commercial vehicles and motor cycles)	334.8	561.6	+68
Coal, iron and steel ..	485.4	536.6	+11
Pressure pipes	545.3	499.8	− 8
Building industry ..	321.6	397.2	+24
Heavy engineering ..	396.4	320.8	−19
General engineering ..	570.3	526.4	− 8
Railway equipment ..	321.8	345.3	+ 7
Domestic goods ..	152.9	111.3	−27
Unclassified	259.6	169.6	−35
Totals	3,388.1	3,468.6	+ 2
Of which castings in malleable iron only ..	120.4	160.9	+34

founding industry was much brighter than when he was first approached. Only by considering the years since the 1914/18 war, he said, was it possible to gain a conception of the foundry business as an industry; prior to that it had been an agglomeration of independent competing units. He confirmed his view that the ironfoundry industry had inescapable links with the iron and steel industry as a whole. It was dependent on the same basic raw materials as the steel industry and this, of course, was one of the main reasons for the inclusion of ironfounding within the general supervision of the Iron and Steel Board. However, there had been important limitations to the power of the Board in respect of ironfounding. Next, Sir Frederick dealt with relations with other industries, saying that 27 per cent. of ironfounders were "tied" to the engineering industry, producing castings solely for

* Sir Frederick, who is chairman of Stanton Ironworks Company, Limited, was lecturing at the annual conference of the Institute of British Foundrymen, in Scarborough.

† Since these figures were made public, last June, a number of interesting trends have been revealed by changing events. The JOURNAL is indebted to Mr. P. Moore of the Council of Ironfoundry Associations for bringing the statistics tabulated up to date at the time of going to press, so that the effect of recent events can be gauged—Editor.

TABLE 3.—*A: Comparative Rates of Iron and Steel Production; B: Iron Castings Production per Head of Population, and C: Indices based on 1949, in the US, UK and West Germany.*

Year	A: Production (English long tons × 1,000). USA		UK		West Germany.				Ratio of iron-castings production to crude-steel production. USA	UK	West Germany.		B: Population (millions). USA	UK	West Germany.		Production of iron castings per head of population (English long tons). USA	UK	West Germany.	
					Excluding Saar.		Including Saar.													
	Iron Castings.	Crude Steel.	Iron Castings.	Crude Steel.	Iron Castings.	Crude Steel.	Iron Castings.	Crude Steel.			Excl. Saar.	Incl. Saar.			Excl. Saar.	Incl. Saar.			Excl. Saar.	Incl. Saar.
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*	*o*	*p*	*q*	*r*	*s*	*t*
1949	10,060	69,630	3,390	15,550	1,520	9,010	1,616	10,740	0.144	0.218	0.169	0.150	149.1	50.4	48.3	49.2	0.0675	0.0673	0.0315	0.0328
1950	12,340	86,460	3,490	16,290	1,950	11,930	2,067	13,798	0.143	0.214	0.163	0.150	151.7	50.3	49.1	50.0	0.0813	0.0694	0.0397	0.0413
1951	14,350	93,930	3,750	15,640	2,490	13,290	2,647	15,855	0.153	0.240	0.187	0.167	154.4	50.3	49.5	50.5	0.0929	0.0746	0.0503	0.0524
1952	12,320	83,190	3,830	16,420	2,610	15,560	2,768	18,334	0.148	0.233	0.168	0.151	157.0	50.4	49.8	50.8	0.0785	0.0760	0.0324	0.0345
1953	13,110	99,650	3,640	17,610	2,300	15,180	2,455	17,818	0.132	0.207	0.152	0.138	159.6	50.6	50.4	51.4	0.0821	0.0719	0.0456	0.0478
1954	11,020	78,850	3,740	18,520	2,710	17,160	2,896	19,920	0.140	0.202	0.158	0.145	162.4	50.8	50.9	51.9	0.0679	0.0736	0.0532	0.0558
1955	14,230	104,500	3,930	19,790	3,270	21,000	3,493	24,114	0.136	0.199	0.156	0.145	165.3	51.0	51.4	52.4	0.0861	0.0771	0.0636	0.0667
1956	13,230	102,870	3,900	20,660	3,320	22,820	3,548*	26,144	0.129	0.189	0.145	0.136	168.2	51.2	52.0	53.0	0.0787	0.0762	0.0638	0.0669
1957	12,080	100,640	3,720	21,700	3,180	24,120	3,399*	27,505	0.120	0.171	0.132	0.124	171.2	51.4	52.7	53.7	0.0706	0.0724	0.0603	0.0633
1958	9,848	76,120	3,470	19,570	2,970	22,430	—	—	0.129	0.177	0.132	—	174.8	51.7	53.3	—	0.0563	0.0671	0.0557	—

C: *Indices, 1949 = 100.*

1949	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1950	122.7	124.2	103.0	104.8	128.3	132.4	127.9	128.5	99.3	98.2	96.5	100.0	101.7	99.8	101.7	101.6	120.4	103.1	125.9	123.5
1951	142.6	134.9	110.6	100.6	163.8	147.5	163.8	147.6	106.2	110.1	110.7	111.3	103.6	99.8	102.5	102.6	137.6	110.8	159.7	159.8
1952	122.5	119.5	113.0	105.6	171.7	172.7	171.3	170.7	102.8	106.9	99.4	100.7	105.3	100.0	103.1	103.3	121.6	116.8	112.9	144.8
1953	130.3	143.1	107.4	113.2	151.3	168.5	151.9	165.9	91.7	95.0	89.9	92.0	107.0	100.4	104.3	104.5	121.6	109.4	168.9	170.1
1954	109.5	113.3	110.3	119.1	178.3	190.5	179.2	185.5	97.2	92.7	93.5	96.7	108.9	100.8	105.5	106.5	106.4	114.6	201.5	203.4
1955	141.5	150.1	115.9	127.3	215.1	233.1	216.2	224.5	94.4	91.3	92.3	96.7	110.9	101.2	107.6	106.5	127.6	113.2	202.5	204.0
1956	131.5	147.8	115.0	132.9	218.4	253.3	219.6	243.4	89.6	86.7	85.8	90.7	112.8	101.6	107.7	107.7	116.6	107.6	191.4	193.0
1957	120.1	144.6	109.7	139.6	209.2	267.7	210.3	256.1	83.3	78.4	78.1	82.7	114.8	102.0	109.1	109.1	104.6	107.6	176.4	—
1958	97.9	109.3	102.4	125.9	195.4	248.9	—	—	89.6	81.2	78.1	—	117.2	102.6	110.4	—	83.4	99.7	176.8	—

* Estimated.

use by parent companies; about 59 per cent. were "free" and the remaining 14 per cent. sold some castings in the open market and some for parent companies. Out of 1,648 ironfoundry firms in the UK, 1,071 employed 50 people or fewer (see Table 1). Despite what appeared from this table, the very smallest foundries were in fact being reduced in number, the lecturer added.*

"Let's Buy Outside" Attitude

Continuing, Sir Frederick mentioned the value of "good-housekeeping" in increasing the productivity of founders and gave instances of where American figures for the total number of ironfoundries showed a parallel with those of this country. Early in the century there had been 4,000 ironfoundries in the US, 3,000 in 1941, and only 2,000 in 1959. Here he quoted from *Gray Iron News*,† the Journal of the American Gray Iron Founders' Society, describing the modern foundry set-up in the States, which showed an increase in the "let's buy outside" attitude by owners of tied foundries. Then Sir Frederick explained his various tabulated statistics, saying that Table 2, for example, showed the change in the type of production from 1949 to 1958, but pointing out the difficulty of drawing any serious inferences from it, because of factors not revealed.

Competition from Alternative Materials

Brief reference was made to the competition which ironfounders were experiencing from alternative materials, such as reinforced concrete, plastics, man-made fibres, weldments, etc., and it was not to be expected, said Sir Frederick, that the foundry industry would retain all the end-uses listed in his statistics. Fortunately, however, new uses had arisen faster than old ones had declined (except for the recession years 1957 onwards). Here the lecturer drew attention to Table 5, which showed an interesting analysis of the relation between industrial production and castings output, carried out by Mr. Lars Villner (of Sweden). His paper on the subject had been fully discussed with Mr. Moore of the UK Joint Iron Council before being presented by Mr. Villner at the Foundry Congress at Liège (see FOUNDRY TRADE

* Numbers of iron foundries officially registered as operating in the United Kingdom have shown the following net changes in the last few years: 1955, minus 21; 1956, minus 69; 1957, minus 33; 1958, minus 90, and 1959, minus about 55. Bearing in mind that just a few new foundries have been opened in the period, it would seem clear that over 270 have closed. Not all of these are small foundries, however. Although there is little doubt that, taking the country as a whole, total *capacity* for iron castings production has expanded during the period, this increment mainly concerns the repetition type of castings. It does not by any means follow that the same productive capacity still exists for specialized types of sizeable castings—Editor.

† See also Leading Article in this issue, page 665.

TABLE 4.—*Comparative Statistics of Different Categories of Castings produced in the UK, USA, and West Germany (in English long tons ×1,000).*

	USA							United Kingdom									West Germany							
	Grey-iron castings.							Grey-iron castings.									Grey-iron castings.							
	Heavy steel ingot-moulds.	Pressure pipes and fittings.	Soil pipes and fittings.	Other castings.	Total grey-iron castings.	Malleable iron castings.	Total grey- and malleable iron castings.	Ingot moulds.	Pressure pipes and fittings.	Pipes and gutters other than pressure pipes.	Other castings.	Total grey-iron castings.	Malleable iron castings.	Total grey- and malleable iron castings.	Ingot moulds.	Pressure pipes and fittings.	Pipes and fittings other than pressure pipes.	Other castings.	Total grey-iron castings.	Malleable iron castings.	Total grey- and malleable iron castings.
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*	*o*	*p*	*q*	*r*	*s*	*t*	*u*
Proportion of total in 1949 (per cent)	15.7	9.1	5.0	63.9	93.7	6.3	100	9.4	15.6	2.8	68.6	96.4*	3.6	100	11.2*	17.0*		67.0*	95.2*	4.8*	100*
1949	1585.9	919.4	502.9	6410.8	9419.0	636.9	10055.9	318.3	528.3	96.7	2324.4	3267.7	120.4	3388.1	217.5	332.7	1305.0	—	1855.2	—	1521.0
1950	2061.3	1074.8	679.7	7707.1	11522.9	821.9	12344.8	321.7	555.3	103.5	2376.9	3357.4	129.5	3486.9	—	—	—	—	2365.0	93.5	1948.7
1951	2334.4	1315.4	613.8	9119.1	13382.7	968.9	14351.6	334.3	571.9	108.3	2595.4	3609.9	142.6	3752.5	—	—	—	—	2472.3	126.0	2491.0
1952	1998.5	1171.9	581.7	7738.5	11490.6	826.9	12317.5	322.7	611.0	114.8	2633.1	3681.6	149.1	3830.7	—	—	—	—	2201.7	133.9	2606.2
1953	2526.1	1147.9	604.6	7960.6	12239.2	866.5	13105.7	374.5	669.3	128.5	2331.9	3504.2	134.3	3638.5	—	—	—	—	2577.6	102.4	2304.1
1954	1593.4	1229.2	664.0	6810.0	10296.6	725.0	11021.6	352.1	694.6	129.0	2425.0	3600.7	141.8	3742.5	—	—	—	—	3109.1	162.4	3271.5
1955	2446.3	1501.4	776.4	8523.8	13247.9	986.4	14234.3	378.3	685.1	146.4	2550.9	3760.7	164.4	3925.1	300.7	497.0	2221.4	—	3143.6	174.2	3317.8
1956	2342.9	1559.7	730.2	7742.6	12375.4	849.9	13225.3	429.6	665.6	139.9	2505.0	3740.1	159.1	3899.2	460.6	433.1	2249.9	—	3139.7	170.3	3179.0
1957	2151.2	1206.5	677.1	7272.8	11307.6	770.5	12078.1	434.4	512.1	140.1	2469.2	3555.8	159.3	3715.1	483.2	385.8	2139.7	—	3008.7	175.2	3183.9
1958	1682.5	1140.8	704.2	5732.5	9260.0	589.9	9849.9	360.8	432.6	128.1	2336.2	3307.7	160.9	3468.6	391.7	245.1	182.9	2025.4	2795.1	175.2	2970.3
Proportion of total in 1956	17.7	11.8	5.5	58.5	93.5	6.5	100	11.0	17.0	3.6	64.3	95.9	4.1	100	13.9	13.0		67.8	94.7	5.3	100
1958	17.1	11.6	7.1	58.2	94.0	6.0	100	10.4	13.9	3.7	67.4	95.4	4.6	100	13.2	8.2	4.5	68.2	94.1	5.9	100
	Indices, 1949 = 100†																				
1949	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	—	100.0	—	100.0	—	—	—
1950	130.0	116.9	135.2	120.2	122.3	129.0	122.8	101.1	105.1	107.0	102.3	102.7	107.6	102.9	100.0	—	—	—	100.0	100.0	100.0
1951	147.2	143.1	122.1	142.2	142.1	152.1	142.7	105.0	108.3	112.0	111.7	110.5	118.4	110.8	—	—	—	—	127.5	134.8	127.8
1952	126.0	127.5	115.7	120.7	122.0	129.8	122.5	101.4	115.7	118.2	113.3	112.7	123.8	113.1	—	—	—	—	133.3	143.2	133.7
1953	159.3	124.9	120.2	124.2	129.9	136.0	130.3	117.7	126.7	132.9	100.3	107.2	111.5	107.4	—	—	—	—	118.7	109.5	118.2
1954	100.5	133.7	132.0	106.2	109.3	113.8	109.6	110.6	131.5	133.4	109.7	110.2	117.8	110.5	—	—	—	—	138.9	140.0	139.0
1955	154.3	163.3	154.4	133.0	140.7	154.9	141.6	118.9	129.7	151.4	107.8	114.5	136.5	115.1	179.6	149.4	170.2	167.6	173.7	167.9	170.3
1956	147.7	169.6	145.2	120.8	131.4	133.4	131.5	135.0	126.0	144.0	106.2	108.8	115.1	109.7	211.8	130.2	172.4	169.4	186.3	170.3	183.1
1957	135.6	131.2	134.6	113.4	120.1	121.0	120.1	136.5	96.9	132.5	100.5	101.2	133.6	102.4	222.2	116.0	164.0	162.2	182.1	163.1	182.4
1958	106.1	124.1	140.0	89.4	98.3	92.6	98.0	113.4	91.3	132.5	100.5	101.2	133.6	102.4	180.1	155.2	113.6	150.7	187.4	152.4	

* 1950. † West Germany, 1950 = 100.

JOURNAL, January 1 and January 8, 1959). Mr. Moore had been strongly in favour of using the years 1949 to 1957 as the basis for the trend, but Mr. Villner had preferred to take 1946 to 1957. Both Mr. Moore's and Mr. Villner's basic findings were summarized and shown in the Table in question.

More Economies Necessary

Up to 1914, Sir Frederick went on to say, United Kingdom industrial development had been based on coal and iron—in effect, cheap coal. Changes since then had been reflected in huge increases in the price of coal, and iron had borne a proportionately high increase and was thus at a disadvantage compared with concrete or asbestos cement, for example. Such disparity was also reflected in the gap between scrap and pig-iron prices. Two general inferences could be drawn: (1) that more economies were necessary in coal consumption, and (2) that foundry technical experts must work for further economies in production methods. The qualities of cast-iron were still not fully exploited, and still less fully understood by people outside the industry. There must be more customer/founder liaison, with the realization that any complaint about a single casting was in effect a complaint against the whole industry, Sir Frederick added. Yet another approach to considering future prospects was to take the statistics and view their extrapolation *vis-à-vis* those of the United States of America and West Germany. Here, Sir Frederick referred to Tables 3 and 4, saying

TABLE 5.—*Iron Castings Production in Relation to Industrial Production (and Extrapolations based on Mr. Villner's and Mr. Moore's concepts).*

Year.	Index on industrial production, 1953 = 100.	Castings production.	
		Index 1953 = 100.	Tons (× 1,000).
1946 ..	72.1	69.7	2,537
1947 ..	76.5	78.2	2,846
1948 ..	83.1	90.3	3,284
1949 ..	88.2	93.1	3,388
1950 ..	94.1	95.9	3,487
1951 ..	97.1	103.1	3,752
1952 ..	94.1	105.3	3,831
1953 ..	100.0	100.0	3,638
1954 ..	107.4	102.9	3,742
1955 ..	113.2	107.9	3,925
1956 ..	112.5	107.2	3,899
1957 ..	115.4	102.1	3,715
1958 ..	114.0	93.6	3,403
1959 (est.)	119.0	96.2	3,500
	Projection on basis of 3½ per cent. p.a. increase.	Projection of trends on the basis of continued average relation between industrial production and castings production.	
		(Mr. Villner's basis, 1946 to 1957.)	(Mr. Moore's basis, 1949 to 1957.)
1960 ..	123.2	116.1	109.1
1962 ..	131.9	122.5	112.0
1965 ..	146.3	133.0	117.0
1975 ..	206.3	176.9	137.6
2000 ..	487.6	382.5	234.4
		(Mr. Villner's basis, 1946 to 1957.)	(Mr. Moore's basis, 1949 to 1957.)
1960 ..		4,224	3,969
1962 ..		4,457	4,075
1965 ..		4,839	4,256
1975 ..		6,436	5,006
2000 ..		13,915	8,527

Notes: (1) Mr. Villner selects an exponential curve of the form $Y = a.X^b$ (where Y = the index of cast-iron production, X = the index of industrial production and a and b are constants). Almost the same results, however, are obtained from an equation of the first degree of the form $Y = a + bX$, which is the formula adopted by Mr. Moore.* The analysis of the relation can therefore be carried through both for the period 1949-57 (the period chosen by Mr. Moore) and for the period 1946-57 (the period chosen by Mr. Villner) on the basis of Mr. Moore's formula without materially altering Mr. Villner's conclusions. The differences between the results obtained by using the period 1946-57 and 1949-57 are considerable, *e.g.*, (3) 1946-1957 $Y = 26.051 + 0.731X$ and for 1949-57 $Y = 66.674 + 0.344X$. This can be simply illustrated by reference to the Table, where a cumulative rate of increase in industrial production of 3½ per cent. p.a. is assumed to take place over the years 1959-2000 (although the figure for this year is not to be taken too seriously!)

(2) The Table projecting the trend demonstrates that to have much forward economic logic an exponential curve of asymptotic form would probably give the most significant results, *i.e.*, $Y = K + sb^x$ where K is the asymptote.

(3) $Yc = a + bX$ (data as shown in Table); $a = Y - bX$ and $b = \xi\, xy \,/\, \xi\, x^2$ (see below).

(4) The series has been amended to allow the usage of more-reliable indices of industrial production (the London and Cambridge Economic Service series being used), to obtain a greater accuracy of working and to take into account later information. This leads to only small change in the earlier years, but to noticeable differences for later years.

TABLE 6.—*Indices of Industrial Production and Iron-castings Usage, 1949 to 1958.*

—	All industries.		All manufacturing industries.		Engineering, shipbuilding and electrical goods.		Vehicles.		Building and contracting.	
	Industries.	Castings.	Industries.	Castings.	Industries.	Castings.	Industries.	Castings.	Industries.	Castings.
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1949	100	100	100	100	100	100	100	100	100	100
1950	108	103	108	102	109	98	109	121	100	107
1951	110	110	113	112	120	110	112	131	96	108
1952	108	110	108	113	120	111	112	126	99	111
1953	114	107	115	102	122	90	124	114	106	119
1954	123	110	124	105	132	92	140	137	110	121
1955	129	115	133	111	146	100	155	161	110	129
1956	128	114	131	110	143	104	144	138	117	134
1957	130	109	133	109	146	97	149	155	117	137
1958	128	101	132	105	—	87	160	165	116	123
Average annual increase, 1949-1955 inclusive (per cent.)	+4½	+2½	+5	+2	+6½	0	+7½	+8½	+1½	+4½
Average annual increase, 1955-1957 inclusive (per cent.)	+½	−2½	0	−1	0	−1½	−2	−2	+3½	+3
Percentage of total iron-castings output in 1957 accounted for by this group	—	100	—	57	—	25	—	14	—	12
Percentage of total iron-castings output in 1958 accounted for by this group	—	100	—	59	—	24	—	16	—	11

that the US might be a mirror, though there was a danger of its being a distorting one due to "off-the-beam" changes. It was then possible, he said, to transfer this forward thinking to the changes within the various consuming groups in the industry (see Table 6).

Conclusion

In conclusion, Sir Frederick said that he hoped that the commercial consideration which he had outlined would not be out of place amongst the technical people gathered at the conference. Perhaps the figures presented would enable those present to get a broader picture of the industry as it stood to-day, and of its future.

A FIRE which occurred at the iron foundry of J. H. Heaton, Limited, Market Street, Keighley, caused damage to the ground-floor core- and fettling-shops. Arrangements have been made to carry on business as usual.

Dangerous Machinery: Contributory Negligence of an Employee who was operating a Mill

By "Barrister-at-Law"

Another important decision, with regard to the effect of contributory negligence on the part of a workman operating dangerous machinery, has been given in the recent case of Rushton *versus* Turner Brothers Asbestos, Limited. Under S.14(I) of the Factories Act 1937, every dangerous part of any machinery is required to be securely fenced, unless it is in such a position or of such construction as to be as safe to every person employed as it would be if securely fenced. In the above case, the plaintiff brought an action against his employers claiming damages in respect of an injury which he had sustained, when in their employment, while operating a machine. The basis of the claim was that the employers had been guilty of a breach of the above provision of the Factories Act, in failing to cause the dangerous parts of a machine which he was required to operate to be securely fenced.

The Material Facts

The material facts of this case were as follow. The machine in question was for all practical purposes the same as a foundry sand mill, and consisted of a rotating pan within which were two rotating stones connected by a central pin. The purpose of the mill was to crush the material with which it was fed. From time to time, the material, as it was crushed, tended to stick in the grooves along which a trap door slid at the base of the machine. Through this trap door the material poured into a chute. The mill could be cleaned from above by lifting the cover off the pan, for this purpose the machine being stopped (whereupon the stones automatically ceased to rotate). There was an alternative method of cleaning, however, which was more usually adopted. When using this method, the trapdoor at the bottom was opened and the grooves cleaned by hand from below, the hand being pushed through the trap door into the inside of the machine, where the grooves were. This method likewise necessitated the stopping of the rotation of the stones. The defendants were aware that this alternative method was usually adopted by their workmen, whose practice it was to stop the machine before attempting to clean the machine in this way. There was, however, *no guard or barrier on this part of the mill.* (Pausing there for a moment, it would appear that this part of the machine at any rate was of a dangerous character, and that accordingly a statutory obligation was imposed on the employers to fence it securely.)

Workman's Previous Training

The workman who was suing in this case had previously received adequate training in using and cleaning the machine, and he had been warned never to attempt to clean it without first stopping it. Moreover, a card had been handed to him which set out various safety measures which were to be adopted, and which likewise contained a warning against touching any parts of the mill while it was in motion, excepting those parts which it was part of his job to touch while operating it. He had been given proper instructions by the foreman and by an instructor in the operating procedure.

The Accident

At the date of the accident, the workman had been operating the mill for about six months. On the occasion in question, it was found that a small piece of metal had broken away from the top edge of one of the grooves, the effect of which had been to separate the groove from the pan with the rotating stones. However, the mill was considered to be still safe to use, though in that condition, and it was decided to continue using it for the remainder of the shift, the workman being fully aware of its condition. Later in the afternoon, when it became necessary to clean the groove, the workman put his left hand into the machine for the purpose, while the machine was still in motion, and got his fingers crushed. On these facts the court had to determine whether there was any liability on the part of the employers.

Were the Employers in Breach?

The employers had thought that no sensible workman would attempt to clean the machine while it was in motion. However, the Factories Act, it should be pointed out, is designed *inter alia,* for the benefit of workmen who do not act as sensibly as they ought. The employers were aware that their workmen were in the habit of cleaning the machine in the manner described above. That being so, they ought to have contemplated the possibilities that some day, someone would attempt to clean the machine in this way *while the machine was in motion.* The employers, therefore, were regarded by the Court as being in breach of their statutory obligations in failing to fence the machine securely.

Effect of Contributory Negligence of Workman

On the other hand, however, the workman had been guilty of contributory negligence. His foolish conduct had contributed to the accident. The question arose as to whether this contributory negligence was the cause of the accident, to the extent of 100 per cent. responsibility, or to some lesser extent. If it was 100 per cent. responsibility, then it would have been the *sole effective cause* of the accident, and the employers could not be held responsible, not withstanding their default in fencing as required by the Factories Act. The Court held that, on the facts of this case, the workman was 100 per cent. to blame, and that therefore the employers were not liable.

Dangerous Machinery : Contributory Negligence

Basis of the Decision

It was pointed out by the Court that the workman had not been injured by reason of some *accidental omission* to take care; nor had it been a case of *momentary* inadvertence, or *failure to remember* the safety rules with regard to the operation of the machine. On the contrary, *the workman had known full well that the machine was in motion*, and moreover, that the limited protection given by the top of the groove had been greatly reduced by the breakage; further, he must have known of the great risk he was running in *deliberately* inserting his hand into the moving groove. The workman, in fact, admitted in evidence that it was a " crazy " thing to do, and that he was not likely to repeat it. As his act had been *quite deliberate*, it had been, in the opinion of the Court, the *operative and effective* cause of the accident. This is a decision which all employers and employees should carefully note.

Metallurgical Abstract

Effect of Specimen Taper on Determination of Elongation in the Tension Test. E. B. KULA and F. R. LARSON. (" ASTM Bulletin," 1959; No. 238; pp. 58-61). In the ASTM standards for round tension specimens, a 1 per cent. difference in diameter is permitted between the centre and ends of the gauge-length section. This difference in original diameter at these two points is found to lead to difference in local strain of over 30 per cent. Two models for the shape of a tension specimen are assumed, and the effect of the difference in strain between the centre and the end of the gauge-length section on total elongation is calculated.

Standard ASTM specimens of titanium, iron, and copper were prepared. Calculated results for materials with strain-hardening exponents of 0.17, 0.22, and 0.38, typical of titanium, iron, and copper are shown. In the case of steel, a conical bar has elongated only 19.8 per cent., whereas a uniform bar would have elongated 24.6 per cent. An effort was made to check these calculations experimentally. With mild-steel bars, the strain at maximum load was only 0.16, lower than usual for this material.

At this strain, the elongation for the uniform bar was 16.6 per cent. and the standard ASTM bar, 13.9 per cent. Calculations give 17.4 per cent. for the uniform bar, 14.8 per cent. for the parabolic bar, and 13.6 per cent. for the conical bar. It is hoped that in the future more effort will be centred on the development of commercially-available, recording-diameter gauges.

FOUR LARGE CLOSED-CIRCUIT AIR COOLERS for the ventilation of the main motor room of the new strip mill now being built for Colvilles, Limited, at Ravenscraig, have been ordered from Heenan & Froude, Limited, Worcester, by Ozonair Engineering, Limited, of Rochester.

Book Reviews

Dimensional Control in Precision Manufacturing. By John L. Gadzala. Published by McGraw-Hill Publishing Company, Limited, 95, Farringdon Street, London, E.C.4; price 58s.

This admirably lucid and detailed exposition of the system devised by the author for constructing dimensional-tolerance charts is a useful addition to the literature on a frequently neglected branch of process planning. Mr. Gadzala has attempted to combine in his system the best features of a number of methods of constructing tolerance-charts, and it is therefore worthy of close study. His step-by-step explanations are coupled with clear diagrams and many illustrative examples of the practical application of the "method of traces " in the dimensioning of shafts, hubs, gears, housings, etc. Although the book inevitably reflects the author's background in the American aircraft and automobile industries, it will be of considerable assistance to engineers in other industries in clarifying and simplifying existing dimensional planning procedures.

Sound methods of calculating accumulations of dimensional tolerances in series of production machining operations in order to construct reliable tolerance-charts can contribute significantly to the improvement of process planning, and hence to the reduction of production costs, by helping to ensure that productive resources are being used most effectively. As the demands for greater precision increase in many fields of production, the opportunities for cost reduction through dimensional control will also increase, and thus it is essential that in future the problems involved should be more closely studied than they have often been in the past. Mr. Gadzala's book is a useful starting point for such a study of some of the most important practical aspects of the subject.

D. D. MORGAN.

Asbestos: Its Industrial Applications, by D. V. Rosato. Published by Chapman and Hall, 37, Essex Street, London, W.C.2; price 46s. net.

Although asbestos has probably been used for two millenniums it is still a material used extensively in industrial and other connections. In fact, with the improvement in existing asbestos products and the introduction of new ones, it has become obvious in recent years that asbestos is far from being a " played out " material. It is therefore appropriate to note the appearance of this book, not least because of the wide range of asbestos products which are described and assessed.

The author has assembled his material under ten chapter headings based on mode of utilization, the chief of which include asbestos-cement products, tiles, heat insulation, electrical insulation, friction materials, asbestos textiles, plastics, asbestos packings and gaskets and asbestos filters. The text is well illustrated and there is an adequate index and a useful bibliography. This book should prove of value to foundrymen and others concerned with metal melting and the production of castings, etc.

J. E. GARSIDE.

A CONTRACT, valued at over £40,000, for a fleet of Comet tipping trucks for road construction work has been placed with Leyland Motors, Limited, by the Public Works Department of Kuala Lumpur, Malaya. The Indian associate company, Ashok Leyland, Limited, has received an order for 40 bus chassis from the Indian State of Rajasthan, and a repeat order of 30 bus chassis from Ahmedabad Municipal Transport Service.

Equipment and Supplies

Nickel/Chromium Casting Alloy

Henry Wiggin & Company, Limited (Thames House, Millbank, London, S.W.1), report that Nimocast 713C nickel/chromium casting alloy is now available. This alloy is the equivalent of Inconel 713C, an investment-casting alloy for high-temperature service developed in the research laboratories of the International Nickel Company, and already specified for the turbine rotor blading of a number of US gas-turbine aeroengines. It is said to combine outstanding strength with excellent resistance to thermal fatigue at temperatures up to 980 deg. C. and is therefore of interest as a possible alternative to wrought alloys, which offer difficult production problems when developed for service at such elevated temperatures. In the US, where cast rotor-blades are considered acceptable for production engines and are in fact used in substantial numbers, this alloy is now well-established and has won a reputation for reliability under arduous service conditions. Nimocast 713C (the properties of which are set out in Table 1) is readily castable and is reported to develop its best properties when cast in vacuum. Alternatively, it can be cast under a protective atmosphere such as argon. A heat-treatment of two hours at 1,170 deg. C. followed by air-cooling is beneficial but not essential unless maximum mechanical properties are required.

TABLE 1.—*Properties of Nimocast 713C (Nickel/Chromium) Alloy.*
Stress-to-Rupture Properties (tons per sq. in.).
Investment-cast in argon; "as-cast" condition (no heat-treatment).

Temperature, deg. C.	30-hr. life.	100-hr. life.	300-hr. life.	1,000-hr. life.
815	28.0	24.5	21.5	18.0
870	19.5	16.5	14.5	11.5
940	(12.5)	(10.5)	(8.5)	—
980	8.5	7.2	—	—

Investment-cast in vacuum; "as-cast" condition (no heat-treatment).

Temperature, deg. C.	30-hr. life.	100-hr. life.	300-hr. life.	1,000-hr. life.
870	22.8	19.0	16.5	14.5
940	14.0	12.0	10.0	8.5
980	10.5	8.7	7.5	6.8

(Figures in brackets are extrapolated values.)

Bench Shaper and Engraver

During the visit of members of the National Society of Master Patternmakers to Germany, considerable interest was aroused in a small bench router for pattern work, made by Friedrich Zimmermann of Denkendorf. One of the visitors, Mr. Harvey of J. J. Harvey & Pressurecast, Limited, Lime Bank Street, Manchester, 12, bought the one which is illustrated in Fig. 1. Mr. Harvey's firm is to have the agency as from January next and in the meantime is handling UK sales. The machine is actuated by a Bosch motor (220-v., 100-w.) running at 2,400 r.p.m. and has a table 23 by 16¾ in., the height of the spindle being adjustable to 17¾ in., and the pedestal rotatable through 360 deg. The machine will take tools up to 1¼-in. dia. and weighs about 132 lb.; if engraving equipment be incorporated, another 55 lb. is added. With the attachment, the machine can be arranged to engrave from 1 to 1 up to 1 to 5. The equipment described forms part of a range of patternmaking machines, which includes a disc-sanding machine and a universal miller, made by the Zimmermann concern, all which will be handled in the UK by the Harvey company.

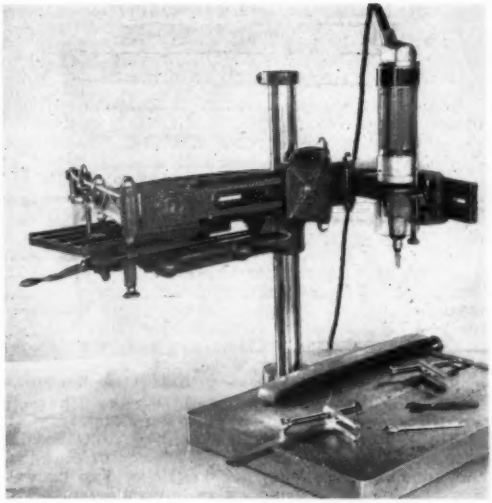


FIG. 1.—*Bench shaper and engraving machine installed in the works of J. J. Harvey & Pressurecast, Limited, of Manchester.*

Self-tapping Threaded Inserts

Tappex Thread Inserts, Limited—as the name indicates—produce a range of self-tapping threaded inserts. These are sold through Davis & Timmins, Limited, Billet Road, Walthamstow, London, E.17, and for them quite a number of foundry applications can be visualized. The new component is illustrated in Fig. 2, and one obvious foundry use is in the case of plastics and wood patterns, where screwed threads have a limited life. Cross threads, broken taps, and stripped threads in castings and other machined components can also be made good it is claimed, as this gadget, being made of case-hardened steel, will cut its own thread in a wide variety of materials. Where the devices are likely to be in constant use, a special fitting attachment is supplied for use with a machine-tool, but for casual use, an excellent instructional diagram shown on the distributor's catalogue No. GA 1047 (available to readers) outlines the procedure. Tool kits, consisting of a driver, tommy-bar and selection of thread inserts packed together are also available.

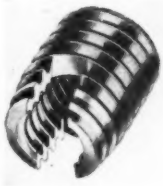


FIG. 2.—*"Tappex" self-tapping threaded insert for use in wood plastics, or metal, marketed by Davis & Timmins, of Walthamstow, E.17. A special fitting attachment is available for use with a machine-tool.*

FURANE PLASTICS have opened a new plant in Hempstead, Long Island, New York.

D

Welding of Cast Irons

Foundryman Lectures to South African Welders

At a recent problems evening of the South African Institution of Welding, Mr. D. Gordon Jones, senior vice-president of the Institute of British Foundrymen (South African branch) presented a short paper on the subject of "The Welding of Cast Irons." During the course of his address, Mr. Gordon Jones stated that welding as applied to cast irons was a process of salvage, reclamation or repair; welding was seldom used as a method of fabrication although some components in s.-g. iron were constructed in this way. Any use of welding in the foundry was governed by the nature of the defect and by economic considerations related to the cost of replacement casting or the time necessary to reproduce it. The weldability of cast-iron, he continued, depended mainly on composition which controlled the physical properties such as expansion, melting range and mechanical strength, but the behaviour during heating and cooling was also important. During founding, mould cooling rates could be controlled by attention to feeding and chilling, variation of thickness and moulding techniques. Although weld metal was a casting, a similar control over the cooling rate was difficult.

Welds should match the Parent Metal

In an ideal sense, the weld metal should match the parent metal and should not produce any significant effects in the heat-affected zone. The lack of ductility of grey iron plus the rigidity meant that it would not yield under heating and cooling stresses and these might be such as to crack the castings. Similarly the molten weld deposit would undergo contraction under conditions of restraint and crack. The method of building a mould around the crack or defect and pouring in molten metal producing a fusion weld was ancient practice and probably the origin of fusion welding. This method was still useful where a substantial quantity of metal must be added, but it did not call for skill. Occasionally Thermit welding was used in this way. The author then referred to the "Code of Practice for the Repair and Reclamation of Grey-iron Castings by Welding and Other Methods" based on a report of sub-committee T.S.23 of the Technical Council of the Institute of British Foundrymen. These documents, he said, set out recommended procedure which had proved successful and served to indicate what could be done if salvage repair and reclamation was properly undertaken.

Choice of Method

The method of welding, said Mr. Jones, depended on the size of the casting and type of defect, and often the choice was determined by the experience of the welder. Success in the use of oxyacetylene depended on judicious use of pre-heating and post-heating and was widely used for simpler castings. Metallic-arc welding had less thermal effect than oxyacetylene and was used to advantage on larger and more complicated castings. Bronze welding using filler material, based on 60/40 types of brass, could be used where pre-heating was difficult but was not to be recommended for castings operating above 250 deg. C. due to a decrease in joint strength. The problem of colour match could be overcome by whitening the alloy by additions of nickel up to 10 to 15 per cent.

Pre-heating

The author pointed out that it would be unwise to commence operations with a cold casting—it should be pre-heated at a degree varying from just warming to 650 deg. C. This should be done to prevent metallurgical changes which cause carbide formation or local hardening, and to reduce risk of cracking from temperature gradients produced in the casting or associated with weld metal contraction. Slow cooling and occasionally post-heating would be complementary to pre-heating.

Heating the whole of the casting was recommended and this taken in conjunction with gas welding was always likely to give good results, Mr. Jones said. Slow uniform heating was necessary and sometimes a temporary structure of brickwork was built around the casting and heated with gas or coke. Compromise was sometimes necessary when local heating only was possible, but great care was required specially in castings of complicated shape.

Metallic-arc Welding

Dealing with metallic-arc welding, the author said that a wide variety of rods were used, but the deposition of cast-iron as such was the exception. Mild-steel, austenitic stainless-steel, nickel and nickel alloys, tin and aluminium were all employed. Mild-steel would absorb carbon from castings, he said, to produce a steel composition with a high hardening characteristic—cooling had to be very slow, however, to avoid hardening. Nickel alloys also absorbed carbon, but it would be present as graphite and not carbides, so the weld would remain soft and machinable and the ductility of the weld would offset contractional stresses. It was claimed, he continued, that various electrodes would produce "soft welds," but while the deposit might be soft, if a true fusion had been made there was inevitably a heat-affected zone where cementite and perhaps martensite would exist, the significance of which would depend on service conditions. A buttering technique might be used whereby the sides of the weld were just coated with a nickel electrode, and the weld completed with a steel electrode so that the carbon was less easily absorbed by the steel. The author then said that it was advisable, where pre-heating was limited, to use small-dia. rods and short runs to avoid excessive heat build-up. When the deposited metal was flush with the parent metal, further runs might be laid to temper the heat-affected zones, he continued, but care must be taken not to overlap the parent metal again.

Other Methods

Another method used for remedying surface defects, he said, employed a bare nickel wire deposited at low current conditions. The rod was vibrated and, in effect, the nickel "sputtered" on to the surface as a series of particles. The deposit so produced was porous, but did not heat the casting, and for the purpose for which it was intended provided a useful tool. Recently, a 5 per cent. Ni cast-iron rod has been developed for the gas-welding of s.-g. iron. Strong joints were possible with the use of nickel-iron electrodes, but there was still the danger of a hard heat-affected zone, though this might be avoided by heat-treatment. Malleable cast-irons depended on heat-treatment for their properties, he went on, and bronze welding was the method employed here if salvage was considered at all. White iron, either unalloyed or alloyed (Ni-Hard), was very difficult to weld, as the cracking hazard was very great. Austenitic cast-irons (Ni-Resist) could be welded with similar materials, or with Monel or Ni/Fe rods, without difficulty, but distortion risks were greater. The author concluded by saying that the overall mechanical properties of welded joints in cast iron might be summarized by the statement that these could be made to match the parent metal if joints were properly made.

Company News

DUNSWART IRON & STEEL WORKS, LIMITED—There is a net loss of £15,869 (profit of £24,434) for the year to June 30, 1959. No dividend is being paid on the ordinary.

CLEVELAND BRIDGE & ENGINEERING COMPANY, LIMITED—The chairman, Mr. J. R. Dixon, states that the order-book is good at present and there is also capacity for new work in the shops and also in the engineering field. Inquiries are expected for a considerable amount of bridgework for new road and railway improvements.

ALENCO, LIMITED (formerly Kay & Company (Engineers), Limited), engineers, machinists, and brassfounders, of Bolton—Final dividend for the 18 months ended September 30, 1959, is 40 per cent. making 100 per cent. (60 per cent. including interim paid with final for year). Group net profit is £286,425 (£130,258) after UK tax of £296,584 (£144,921).

E. H. BENTALL & COMPANY, LIMITED, agricultural engineers and ironfounders, of Malden (Essex)—The directors propose to increase the capital to £500,000 by the creation of 800,000 ordinary 5s. shares. The increase is in excess of the amount of new capital which would be involved in the rights issue now under consideration. There will be an extra-ordinary meeting on January 11.

MIDLAND BRIGHT DRAWN STEEL & ENGINEERING COMPANY, LIMITED—All the issued share capital of the Castle Engineering Company (Nottingham), Limited, has been acquired for cash. It is stated that this further acquisition will extend the scope of the group's already extensive activity in the manufacture of precision machined parts and will be another outlet for the bright steel bars and wires produced by the company and its subsidiary, A. E. Godrich & Son, Limited.

HILLS (WEST BROMWICH), LIMITED, manufacturers and engineers to the building trades, of West Bromwich—The chairman, Mr. J. MacNish, states that trading for the first three months of the current year is a considerable improvement over the same period a year ago and with the rather healthier conditions prevailing in the industry the outlook for 1959-60 is promising. Due to a change in the company's financial year the next accounts will cover the 17 months ending on December 31, 1960.

CHARLES CHURCHILL & COMPANY, LIMITED, machinery and tool merchants, etc., of Birmingham—During the first eight months of the current financial year order intake is slightly greater than 50 per cent. up on the previous year, states the chairman, Mr. J. B. S. Gabriel. The improvement has been particularly noticeable since the beginning of September, with a "marked jump" in November. The board is confident that the present rate will continue. It is stated that the improvement will not, however, affect the immediate trading position.

Final dividend of STEWARTS AND LLOYDS, LIMITED, is maintained at 8 per cent., making 11 per cent. on the £20,000,000 capital, as previously. A total of not less than 11 per cent. has also been forecast for the current year on the £27,000,000 capital as increased by the rights issue in October. The directors state that the improvement in trade announced at the time of the issue has continued, apart from business with the oil companies. Group trading profit decreased by £3,188,000 to £11,077,000 in the 53 weeks to October 3, 1959, after increased depreciation of £3,394,000, against £2,874,000. Net profit is down from £6,912,000 to £5,799,000.

ISI Translations

In the latest list of translations issued by the Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1, it is recorded that the following is now in course of preparation:—

1528 THE USE OF COMPUTERS FOR CONTROLLING ARC FURNACES, Efroimovich, U.E., *Stal*, 1957, July, pp. 602-608.

Translations which have been made recently by Mr. H. Brutcher, of Technical Translations, P.O. Box 157, Altadena, California, USA (to whom enquiries should be addressed) include:—

HB 4760 THE "SHAKING LADLE," A NEW METALLURGICAL TOOL, Eketorp, S. *Jernkont. Ann.*, 1959, (8), pp. 487-507.

HB 4758 MECHANISM OF DESULPHURIZATION OF HOT METAL WITH SOLID LIME, Gromov, M. I., and L. M. Tsylev. *Ibid.*, pp. 25-28.

HB 4756 EFFECT OF PRIMARY STRUCTURE OF STEEL ON PROPENSITY TO HOT-TEARING, Moldavskii, O. D., and A. P. Pronov. *Ibid.*, pp. 47-51.

HB 4623 LADLE DESULPHURIZATION OF IRON WITH LIME AND ALUMINIUM SUSPENDED IN A GAS, Sobolev, S. K., and G. N. Oiks, *Izvest. VUZ., Chern. Met.*, 1958, (11), pp. 3-8. ($4.90).

In the following list the initials SLA, etc., stand for the organization to which enquiries for translations should be made, quoting the reference numbers. The addresses are given below.

SLA LC 59-17246 ALLAKHVERDIYEV, G. A. "Determination of Soil Corrosion Characteristics for the protection of Underground Installations." *Khozyaystvo* (USSR) 1956, No. 2. pp. 18-22. mi. $2.40, ph. $3.30.

CDS I.T. 2302 ASANO, E. "Analysis of Segregations in Heat-resistant Steels 16-15-6." *Tetsu to Hagane*, 1957, vol. 43, No. 12, pp. 1318-25.

ID-U 1959 (9) 657 BREABAN, M. L. "Vergleichstafeln für STAS-GOST-DIN-N.F.-B.S.-ASTM- Normen für Gussteile aus nichtlegiertem oder schwachlegiertem Grauguss sowie Temperguss." *Standardizartsiya*, 1958, vol. 10, No. 4. pp. 186-90.

SLA LC 59-15781 MARGULIS, D. K. and YU. P. KHOLMOGORTSEV. "Force and Stability Relationships in High-speed Drilling of Cast Iron." *Vestnik Mashin* (USSR) 1957, vol. 37, No. 4. pp. 41-47. mi. $1.80, ph. $1.80.

CDS I.T. 2656 MIYAZAKI, S. "Étude de l'acier de Moulage Austénitique su Manganèse." (en japonais) *Suiyokwai-shi*, 1958, Sept. 13. No. 7. pp. 478-82.

AEI T/1474 OSHCHEPKOV, P. K. "Introscopy" (Non-destructive Testing) of Opaque Materials. *Zavods Lab.* 1959, 25, (6) pp. 684-89.

CDS I.T. 2645 PISARENKO, G. A., S. G. GUTERMAN, and P. V. GUBCHEVSKII. "Fonte de haut fourneau à graphite-sphéroidal" (en russe) *Liteinoe Proizv.* 1959, No. 1, pp. 12-13.

AEI T/1467 POMEY, J., A. ROYEZ and J. P. GEORGES. "High Temperature Hardness." *Rev. Metall.* 1959, 56, (3) pp. 215-228.

Symbols for sources of translations:—
SLA: SLA Translation Centre, John Crerar Library, 86, East Randolph Street, Chicago 1, Illinois, USA. IDU: Institut für Dokumentation Übersetzungsnachveis. East Berlin, W.8, Unter den Linden 8, Germany. CDS: Centre de Documentation Sidérurgique, 6 Rue de Lota, Paris 16, France. AEI: Associated Electrical Industries, Limited, Research Laboratory, Aldermaston Court, Aldermaston, Berkshire. Where the title is quoted in a foreign language the original article has been translated into that language.

"Gas at Work in Industry" Exhibition

An exhibition illustrating "Gas at Work in Industry," sponsored by four of the Area Gas Boards—Eastern, North Thames, South Eastern and Southern, will be held at the Royal Horticultural Hall, Westminster, from March 1 to 12. Besides working plants, models, photographs, films, etc., there will also be demonstrations of steel melting, tinning, die-casting, special-purpose plant for the heat-treatment of metals, and the vitreous enamelling of aluminium.

Personal

Dr. W. G. HISCOCK has been appointed chairman for 1960 of the Lead Development Association.

Mr. A. A. MARSH has been appointed manager of the National Steel Foundry (1914), Limited, Leven, Fife.

Sir OWEN WANSBROUGH-JONES, K.B.E., C.B., has been appointed a director of the British Oxygen Company, Limited.

Brigadier WILLIAM BROOKS, O.B.E., has retired from the board of the Aurora Gear and Engineering Company, Limited, Edmund Road, Sheffield.

Mr. A. I. BAKER, C.B.E., J.P., M.A., M.I.MECH.E., chairman of Baker Perkins, Limited, has been elected president of the British Engineers' Association.

LORD HAILSHAM, Lord Privy Seal and Minister of Science, is to be the chief guest at the Cutlers' Feast to be held at Sheffield Cutlers' Hall on March 29, 1960.

Mr. C. W. MCDONALD, formerly director and works manager of Guy Motors, Limited, has been appointed production manager at the Villiers Engineering Company, Limited.

Mr. G. M. WELLS has been appointed assistant managing director of Hopkinsons, Limited, Huddersfield. Mr. J. A. FULLER is appointed chief engineer in succession to Mr. G. SEWELL (director), who retired on December 22.

Mr. A. O. R. JOHNSON, managing director of T. H. & J. Daniels, Limited, founders and mechanical hydraulic engineers, Stroud, Glos, has been elected a director of a subsidiary company, British Boiler Accessories, Limited.

Sir GEORGE DOWTY, chairman, Mr. R. F. HUNT, Mr. DONALD CAMPBELL, C.B.E., Mr. L. S. FLATMAN, general manager, and Mr. C. J. LUBY have been appointed to the board of Dowty Marine, Limited, the recently-formed subsidiary of the Dowty group.

Mr. JACK BRAY and Mr. ROBERT BURMAN, who have been with J. Parkinson & Son, Limited, machine-tool manufacturers, Shipley, Yorkshire, for 54 and 51 years respectively, have each received a presentation in recognition of their service with the company.

Mr. JOSEPH RICHARDS, the deputy chairman, has been elected chairman of Wombwell Foundry & Engineering Company, Limited, in the place of Mr. FRANCIS HILL-COLE, who has resigned owing to ill-health. Mr. Hill-Cole is to continue as a member of the board.

Mr. M. J. GLENNY, chairman of the Council of Ironfoundry Associations, has accepted the invitation of the National Society of Master Patternmakers to be guest of honour at the Society's annual dinner/dance to be held at the Grand Hotel, Brighton, on May 21, 1960.

Sheffield University Council has conferred the title of Visiting Professor on Professor O. MICHEJDA, Dean of the Mechanical Engineering Department, Politechnika Czestochawska, Szestochowa, Poland, who will be visiting the Department of Mechanical Engineering from January to September, 1960.

Mr. REGINALD IBISON has been appointed to succeed Mr. CHRISTOPHER STEPHENSON on the boards of R. & W. Hawthorn Leslie & Company, Limited, and its subsidiaries. Mr. Stephenson retires to-day (Thursday). Mr. Ibison will also succeed Mr. Stephenson as general manager of Hawthorn Leslie (Shipbuilders), Limited.

Mr. BRIAN P. YATES, secretary of Low Moor Alloy Steel Works, Limited, has been appointed a director. He has been associated with the company for 19 years, and has been secretary since 1945. He is also secretary of Low Moor Fine Steels, Limited, a subsidiary of the Low Moor Steel Works, and secretary of Yorkshire Rolling Mills, Limited.

Mr. C. E. HOLMSTROM, who became a director of John Bedford & Sons, Limited, of Sheffield in April, has been appointed chairman of the company in succession to the EARL OF DENBIGH. The Earl, who has resigned owing to the pressure of other business, is to retire as a director at the end of March, on his return from a business trip to South Africa.

Mr. T. M. HORN has retired from the position of manager of the Leeds branch of Atlas Copco (Great Britain), Limited, and Mr. A. W. TOMBLESON, from the Manchester branch, succeeds him. Concurrent with this change, the existing Leeds area has been divided and a new branch office is being established in Newcastle, with Mr. W. HOSSENT as manager.

At the annual meeting of the *Association Technique de Fonderie*, the *Grande Médaille d'Honneur* of the Association was awarded to Mr. ACHILLE BRIZON; gold medals were awarded to Mr. JACQUES BOUCHER and Mr. HENRI PERCHAT; silver medals to Mr. LOUIS GRAND, Mr. ALBERT LEVASSEUR and Mr. GEORGES ULMER; and bronze medals to Mr. FRANCOIS DANIS and Mr. PIERRE HUBERSON.

Major F. W. SMITH, chairman and managing director of the Enfield Cycle Company, Limited, Redditch, received a gold watch for 50 years' service with the company at a long-service awards presentation on December 15. He was handed the award by his son, Mr. B. W. Smith, a director of the company. At the ceremony certificates for 25 years service were presented to eight men and three women.

Dr. JOHN C. WRIGHT, senior lecturer in metallurgy at Birmingham College of Advanced Technology, has been appointed Reader in Industrial Metallurgy at the College. Aged 29, he joined the staff of the Department of Metallurgy last year. Dr. Wright began his career as a research assistant in the development and research department of the Mond Nickel Company, Limited, with which company he was associated from 1948 to 1954. He is a graduate in Metallurgy of London University. For a year he was technical officer in the research department of Metals Division of Imperial Chemical Industries, Limited, at Witton. He was awarded a PH.D. for his work on solid-fuel-fired gas-turbines.

Obituary

After 42 years' service, Mr. WILFRED BRIAN, chief designer for Brook Motors, Limited, Huddersfield, has died suddenly at the age of 56. He was a past-president of the Huddersfield Engineering Society.

The death is announced of Mr. BERTRAM KIDSON, the well-known Wolverhampton accountant, on December 11. Mr. Kidson was associated with Edward Matthews, Limited, of Bilston, for over 40 years, and was chairman from 1946 until the time of his death.

Mr. THOMAS ARTHUR BARKER, who began work with J. & J. Horsfield, Limited, boilermakers, structural engineers, and ironfounders, of Dewsbury, in 1898, becoming a director in 1950, has died at the age of 76. He was appointed secretary of the company in 1929.

Industry in the Midlands

At a meeting of the Midland Regional Board for Industry in Birmingham, Major C. R. Dibben said that statistics showed that unemployment in the region had fallen from 24,710 to 22,428 between October and November, thus reaching an overall figure of one per cent. This is the best regional figure in the country and only half the national average, Major Dibben said. The number of vacancies in the region stood at 30,305.

Speaking at the press conference following the Board meeting, Major Dibben said that the Midlands had been the only region in the UK to record a substantial drop in unemployment over the last month. "The industrial outlook remains set fair with prospects of more improvement yet." District advisory committees reported an increased shortage of raw materials especially in sheet steel and to a less extent in the alloy steels, but up to the present there had been no "real sense of frustration caused by the shortages," Major Dibben went on. Exports were buoyant although it was anticipated that there might be some contraction in the buying of consumer goods at the end of the year. The output and sales of plant and machinery were beginning to rise significantly in response to heightened demand.

Labour was the chief shortage causing concern and it was definitely putting a check on development, Major Dibben said. There was still very little sign of significant movement of industry from the prosperous Midlands to the major unemployment areas elsewhere. Relocation of industry in areas of high unemployment was, said Major Dibben, "a national problem and we, as the most favoured region in the country, should be prepared if necessary to make some sacrifices towards its solution." Major Dibben went on to say that the congestion in the Midland region was such that any future development must be to some extent retarded.

Teacher Training Courses

Next year, teachers serving in technical colleges will again have the opportunity of going to one of the Technical Teacher Training Colleges for a term's course of teacher training. These "in-service" courses were held for the first time this summer, when nearly 150 teachers were seconded by their employers. Numbers next year promise to be even greater. The courses are intended for those teachers with academic qualifications who have entered technical colleges direct from industry. They are aimed at improving the quality of teaching and thus helping to increase the number of successful technical students. Courses will start after Easter at the three technical training colleges—Bolton, Huddersfield and London (Garnett College) and at the College of Technology, Wolverhampton. The Huddersfield College will also run a course in February.

Lancashire Steel raises its Dividend

Total dividend of the Lancashire Steel Corporation, Limited, is effectively raised from 7 per cent. to 8½ per cent. with a final of 6 per cent., against the forecast of 5½ per cent., on capital doubled by a scrip issue. After heavier provisions for depreciation and replacement, group profits amounted to £3,873,440 for the 53 weeks to October 3, 1959, compared with £2,985,989 for the previous 52 weeks' period.

Taxation charges are up by £200,000 at £1,950,000, and the net balance of £1,923,440 compares with £1,235,989.

Stanley Parsons' 150th Anniversary

This month Stanley Parsons & Company, Limited, makers of weighbridges, weighing machines, etc., St. George's Ironworks, Bradford, celebrated the foundation of the company in 1809 by two Yorkshiremen, Mr. John Hill and Mr. James Brayshaw. The present directors and 80 members of the staff attended a 150th anniversary dinner at the Midland Hotel, Bradford, on December 14.

When Mr. Hill took Mr. Brayshaw into partnership they dealt principally in scales for wool and corn and established a lasting reputation for good craftsmanship and accuracy. Later, James Brayshaw became proprietor of the firm, and, when he was joined by his son, Charles, it became known as James Brayshaw and Son with premises in Booth Street, Bradford. Eventually it was bought as a sideline speculation by Mr. Stanley Parsons, a son of the governing director of Taylor & Parsons, Limited, Bradford, and in 1920 the name was changed to S. Parsons & Company, Limited.

With the move to the present premises in Young Street in 1938, the firm was enabled to make larger capacity machines and to begin manufacture of many types and sizes including dials, hopper weighers and automatic weighers. Mr. Parsons, chairman and governing director of the company died in 1947, but during his lifetime the business had become world famous and its products now find markets all over the world.

POA Course on Materials

The Purchasing Officers Association announces that the third Oxford course is to be held at Christ Church and Pembroke College from March 21 to 25. The course will include for the first time material study groups (in co-operation with the British Iron and Steel Federation and the British Non-Ferrous Metals Federation) and an operations research study group.

In addition to an address by Professor R. W. Revans, B.SC., PH.D., Professor of Industrial Administration, Manchester College of Science and Technology on "The Meaning of Administration," there will also be a panel discussion on "The Effect on Buying Policy and Practice of Current Restrictive Practices Legislation" between Mr. R. L. Sich, C.B.E., Registrar of Restrictive Trading Agreements, Mr. A. H. Thomas, president of POA, and a spokesman from industry.

The fee for full-time attendance at the course will be £25 per person, and a full programme may be obtained from the secretary of the Association, Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4.

Information Centre in Bagdad

For the convenience of businessmen interested in Anglo-Iraqi trade a United Kingdom commercial office has been opened by the British Embassy in the centre of the business quarter of Bagdad. The new office which is situated in the Ottoman Bank Building, New Bank Street, Bagdad, will function as a commercial information centre and a complete service is available for answering commercial enquiries. Facilities include a reading room containing a comprehensive set of trade periodicals and a library of catalogues and other commercial literature provided by United Kingdom firms. Enquiries relating to this announcement should be addressed to the Board of Trade, Commercial Relations & Exports Department, Horse Guards Avenue, Whitehall, London, S.W.1, quoting CRE/1382/G.

Publications Received

Spheroidal-graphite Iron. An excellent brochure, *S.G. Iron: Properties and Applications,* has been published by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1. The covers of the booklet have been carried out as photomicrographs showing the typical nodules always associated with s.-g. iron, and no better introduction to the subject could be given. The brochure opens with a straightforward account of what this iron is and describes the main types. Then, using a series of tables, the material's mechanical properties as-cast and heat-treated are detailed. A system is then followed of taking one property at a time and illustrating its application by showing pictures of castings particularly demanding this attribute. By the luck of the game, all the early illustrations in the booklet are of components made by overseas firms, but, later, founders in this country come in for their fair share. Page 29 of this 36-page well-illustrated brochure introduces a seven-page list of engineering components with a letter, or letters, at the side of each to indicate the more favourable types of iron to use. The reviewer suggests that when circularizing this brochure a list at least of British licensees should be included.

Accidents—How they happen and how to prevent them. No. 41. Published by H.M. Factory Inspectorate through Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2.

Under "Comment" in this issue there is the reminder that on January 1, 1960 there come into force new regulations covering the minimum contents of first-aid boxes. These are detailed in "Form No. 1008: First Aid," obtainable from H.M. Stationery Office, address as above, price 2d. (probably 4d. post free). The contents of this issue are different from the earlier ones insomuch as there is less stress placed on the risks of specific industries and more on accidents which might happen in any works. This obviously makes the publication more practical and interesting for all.

Transport Age, Vol. 2, No. 11. Published by British Transport Commission, 222, Marylebone Road, London, N.W.1.

The reviewer has quite an affection for this publication and would welcome its appearance in his dentist's or doctor's waiting room to replace the "glossies" specially directed to housewives and teenagers. It is exceptionally well produced, the colour illustrations in fact merit the designation of excellent. This issue covers *inter alia,* Gleneagles Hotel, Bristol as an industrial centre, and heavy haulage—which latter even to-day borders on the romantic, except of course for the motorist in a hurry! The magazine is perhaps the best publicity for British Transport launched by the Commission.

Improved Material Utilization. Published by the Institution of Production Engineers, 10, Chesterfield Street, Mayfair, London, W.1; price 13s. 6d. post free.

This report is the work of four committees covering finishes and finishing materials, packaging and shipping materials, ceramics, metal powders and plastics, and ancillary processing materials. Over 80 case-studies are included, some of which will give satisfaction to the foundry industry (at least, that section making precision castings), whilst those dealing with powdered metals may cause a little apprehension. Every reader of this book will find some new application of interest, particularly the innovations in steelfoundry practice, washing of castings, and vitreous enamelling.

Induction Motors. The English Electric Company, Limited, Stafford, have issued two well-produced, excellently-illustrated catalogues covering induction motors. No. PS/133 is a 12-page publication dealing with large squirrel-cage (class L) and slip-ring (class LS) induction motors for speeds up to 1,800 r.p.m. and heavy outputs. For these motors seven different types of enclosures are available. The other catalogue, No. DM/257, covers a range of high-torque, high-slip squirrel-cage induction motors which have been specially designed for applications involving high inertia and frequent load changes. The range is from one to 20 h.p.

Engineering Products. Two 24-page leaflets "What We Make" (No. 5/464) and "Engineering Products" (No. 1/526), have been issued by Ransomes & Rapier, Limited, Ipswich and London. The last-named leaflet is interesting as it carries a series of pictures of the company's drawing office, patternshop, the foundry and machine shops, and finishes off with the various erecting and fitting shops. The second leaflet illustrates a representative collection of the machines for which the firm is noted, such as the W1400 walking dragline.

Coke-burning Appliances Handbook (6th edition). Published by the Gas Council (Coke Department), 1, Grosvenor Place, London, S.W.1; price 35s.

This book is an invaluable work of references for builders' merchants as it details, and illustrates with diagrams and pictures, the leading makes of stoves, cookers and boilers, all of which have been approved for efficiency.

Miniature Fluorescent Lighting Fitting. In leaflet No. L300/1, Victor Products (Wallsend), Limited, Wallsend-on-Tyne, give a very full description of fittings they have designed for 12-in. 8-w. tubular fluorescent lamps, which are supplied with the lamps fitted. The leaflet goes into all the technical details and the reviewer can only add that it is a good-looking job.

House Organs

The Stantonian, Vol. 21, No. 9. Issued by the Stanton Ironworks Company, Limited, near Nottingham.

This issue records what is quite a milestone in the history of the company, namely, the official opening of the new ore-preparation plant,* together with a technical description of it. The co-ordination of all the various units to ensure the designed output of 25,000 to 30,000 tons per week is unquestionably an outstanding feat of metallurgical engineering. The cover and the centre-page spread have been used to print excellent coloured pictures of the new plant.

* See JOURNAL, December 10, 1959.

Nickel Bulletin—November, 1959. Published by The Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

This issue illustrates the major role played by nickel-containing materials in applications requiring heat— and/or corrosion-resistance. Items of interest in this connection range from the development of precipitation-hardening stainless-steels to vacuum-melting.

Broomwade News Bulletin, Vol. 22, No. 4. Issued by Broom & Wade, Limited, High Wycombe, Bucks.

This issue tells of the overseas activities of the company, especially in Canada and the USA.

Law Cases

Failure to maintain Precautions

The failure of Stewarts and Lloyds, Limited, Clydesdale Works, Mossend, Lanarkshire, to take all reasonable steps to ensure the safety of employees working in the vicinity of an overhead crane led to their being fined £20 by Sheriff Wood in Hamilton Sheriff Court.

HM Inspector of Factories, who prosecuted, explained that on November 1 a fitter and two labourers were erecting a screen between the machine-shop bay and the cutting-shop bay. This was being done, he said, because sparks from a large circular saw in the cutting-shop was causing inconvenience to men working in the machine-shop bay. Overhead cranes operated in both bays. After the screen had been erected, it was decided to strengthen it by putting bracing bars across it. One of the labourers, Robert Drench Murray, climbed a ladder to fix the brace and while doing so placed his hand on the travel rail of the overhead crane. As a result the crane travelled over his hand which was completely severed. Murray managed to retain his balance on the ladder and other workmen went to his assistance. The Factory Act regulations made it imperative that the crane driver should have been warned that men were working in the vicinity of the crane, but it was not done in this instance.

A solicitor for the firm said that a foolproof system of warning had been laid down by the management, but, unfortunately, on this occasion, it had not been put into full operation. The foreman in charge, who had been acting as lookout to see that the overhead crane did not approach too close, left after the protecting sheet had been placed in position.

£2,800 Damages for Burned Workman

A 21-year-old Glasgow labourer whose foot was covered with molten metal as he moved weights from moulds was awarded £2,800 damages in the Court of Session. Mr. Robert Burns who sued Dixon's Iron Works, Limited, Crown Street, Glasgow, for £5,000, said he was standing on sand when it gave way and molten metal ran into one of his clogs. He was severely burned on the foot and ankle and was in hospital for six months. Burns said he may have to have an amputation below the right knee. The company, denying liability, claimed their system of working was not dangerous. They said it was Burns' fault because he stood too near the edge of the sand when the accident happened. The jury assessed damages at £3,750 and said the company was three-quarters to blame.

Raw Materials Prices Indices

Principally because the price of raw rubber, after falling in October, rose sharply last month and copper, zinc, and raw cotton showed increases, the wholesale price index of basic materials and fuel used in manufacturing industry rose again in November—the fourth month running. The provisional figure was up 0.4 per cent. to 102.6 (1954=100), compared with 101.5 a year ago.

The increased prices of raw rubber, copper, and other non-ferrous metals were reflected in the indices for materials and fuel used in the electrical machinery industry and the mechanical engineering industries, which rose by 0.8 per cent. and 0.7 per cent., respectively. Manufacturers' wholesale prices do not yet reflect the change having risen by only 0.1 per cent. to 111.7. A year ago the figure was 111.3 for all sales and 111.5 for home-market sales.

Foundry Equipment's Silver Jubilee

On January 27, Foundry Equipment, Limited, celebrates its 25th anniversary as a manufacturing concern at Leighton Buzzard. At a meeting in the main works on December 22, Mr. A. S. Beech, M.I.MECH.E., chairman and managing director, addressing personnel said that during the last three months, the company had received a considerable number of orders for foundry installations and machines, not only from Great Britain and other European countries, but also from USA, Canada, Australia and South Africa. The increase in plant orders for the UK indicated that the two-year period during which the heavy engineering industry in this country had been generally slack was ending.

The company had for many years maintained a good export trade, he continued, and with the advent of new overseas companies in Australia, the USA, South Africa and most recently in Spain, the percentage of export business was increasing yearly, amounting to 58 per cent. of the total during the six months ending on September 30, 1959. Mr. Beech also said that their associated company, F. E. (North America), Limited, Toronto, Canada, had obtained an order for a complete continuous casting plant for an iron foundry in New York State, and that another order was coming through almost immediately for a foundry in Tucson, Arizona.

Another purpose of the meeting was to present gold-watches to five employees who had each completed 20 years' service. Mr. Beech said that these presentations brought the total of long-service employees (those with 20 years' service) up to 18 and the grand total of service represented well over 400 years.

ECSC Steel and Pig-iron Output

Output of crude steel (ingots and castings) in the European Coal and Steel Community in November was lower than the previous month's record total, but still the second highest monthly figure ever recorded.

Production figures place the November output at 5,715,000 *tonnes*, against 5,984,000 *tonnes* in October and 4,583,000 *tonnes* in November, 1958. Production declined slightly in all six Community countries from the record October levels, but this is expected as a normal seasonal occurrence.

The November figures brought output for the first 11 months of the year to 57,519,000 *tonnes*—7.8 per cent. more than the 53,430,000 *tonnes* for the corresponding period last year.

Output of pig-iron and ferro-alloys also declined slightly to 4,167,000 *tonnes*, compared with 4,320,000 in October and 3,525,000 in November, 1958. For the first 11 months output amounted to 42,434,000 *tonnes*—6.1 per cent. more than the 39,996,000 *tonnes* produced in the January-November period, 1958.

Skinningrove Iron Company's Development

Whole of the development scheme put forward by the Skinningrove Iron Company, Limited, Saltburn-by-the-Sea (Yorks), earlier this year has now been officially endorsed. Total expenditure involved in the scheme is about £1,000,000.

The two new housings for the 36-in. rolling mill are now being made and will be installed next August. Work on the new crushing, screening, and sintering plant for the preparation of blast-furnace ores will start as soon as possible.

News in Brief

SIR STUART GOODWIN, the Sheffield industrialist, and Lady Goodwin, have given £60,000 to Sheffield University towards the provision of a swimming bath, the total cost of which will be between £90,000 and £95,000. Sir Stuart and Lady Goodwin had already donated £30,000 towards a new gymnasium being erected at the University.

REGIE NATIONALE RENAULT, France's largest automobile company, has moved into sixth place among car and truck builders in the world. The company now manufactures 2,250 vehicles a day, including 1,700 "Dauphine" cars. During the first half of 1959, Renault shipped 131,608 vehicles or 53½ per cent. of its output for delivery abroad.

RICHARD DUNSTON, LIMITED, shipbuilders, Thorne, near Doncaster, have secured an order for two 100-ft. trawlers from the Colne Fishing Company, of Lowestoft. These will increase the Colne fleet to 29, five of which were built by the Thorne firm. The trawlers will have hydraulic steering, and an echometer for finding shoals of fish.

Mr. L. CLEAVER, M.P. for Yardley, Birmingham, has asked the Chancellor of the Exchequer if he would consider removing the 12½ per cent. purchase tax imposed on cast-iron holloware, so as to encourage the ironfoundry industry, which has been in difficulties due to the credit squeeze. Sir Edward Boyle replied that the matter would be borne in mind.

DR. W. C. WINEGARD, associate Professor of Metallurgy in the University of Toronto, will be the lecturer at a meeting of the metal physics committee of the Institute of Metals to be held at the Institute's headquarters, 17, Belgrave Square, London, S.W.1, on February 10, 1960, commencing 6.30 p.m. The subject of the lecture will be "Solidification of Alloys."

DAYSTROM INCORPORATED, has opened a new manufacturing plant for electronic and electrical products, at Gloucester. The new firm—known as Daystrom, Limited—has been operating in leased premises in Gloucester for the past year. The managing director is Mr. A. E. B. Perrigo. The new building, which houses plant and offices, covers 10,000 sq. ft., and is designed for expansion to 70,000 sq. ft.

THE BRITISH TRANSPORT COMMISSION has placed an order with Yorkshire Engine Company, Limited, Sheffield (a subsidiary of the United Steel Companies, Limited), for the supply of 10 170 h.p. diesel-hydraulic shunting locomotives. Delivery will take place in 1960. The locomotives will be used on the London Midland region of British Railways, principally in the Manchester and Liverpool dock areas.

SHEFFIELD FIRMS exhibiting at the British Exhibition in New York next June include Thos. Firth and John Brown, Limited,—a fully-hardened forged-steel roll; Samuel Fox and Company, Limited,—razor-blade and watchspring steel; Hadfields, Limited,—an extrusion press liner and a Boron "sandwich" plate as used for reactors. In the steel section there will be a special display of Sheffield hand-tools and stainless-steel cutlery.

THE ROLLS-ROYCE FACTORY at Mountsorrell, North Leicestershire, which was almost completely destroyed by fire seven months ago has been completely rebuilt, and will be back in production by the end of January. The factory makes sheet-metal assemblies for jet-aircraft engines and many of the 1,000 employees who were found temporary work in other Rolls-Royce factories in the Derby area, have returned to Mountsorrell.

£3,000 HAS BEEN DONATED by the Department of Scientific and Industrial Research, to the metallurgy section of Rotherham College of Technology in recognition of the work of Mr. D. Yarnton in powder metallurgy, said Mr. G. E. Cooke, the principal, at the annual prize distribution on December 11. The money was being devoted to the employment of a full-time assistant and also to the purchase of extra equipment.

HEYES & COMPANY, LIMITED, Wigan, have received an order from the North Western division of the National Coal Board, for two sets of the type-40 shaft-signalling system for use in Parkside Colliery, which the division is preparing for use at Newton-le-Willows. Since the introduction of the type-40 indicator earlier this year, the company has received orders from six divisions of the NCB. The system will be installed in Parkside in the spring.

AN ORDER for five sets of combined change-over and safety valves for the UK Atomic Energy Commission has been received by Cockburns, Limited, Glasgow. The valves of the Cockburn patent full-bore type, with deadweight control valves, are for Windscale nuclear power-station in Cumberland. In addition to Windscale, the company has supplied valves and fittings to the nuclear power-stations at Bradwell, Hinkley Point and Hunterston.

DAVY AND UNITED ENGINEERING COMPANY, LIMITED, Sheffield, have secured the contract, valued at more than £4,000,000, for the building of the 68-in.-wide hot strip mill for the new Spencer works at Newport, Monmouthshire, for Richard Thomas & Baldwins, Limited. The mill will go into production in October, 1961, with an initial output of about 1,000,000 tons of strip steel a year, but designed for an eventual output of about 3,000,000 tons a year.

WORK ON SCHEMES TOTALLING £2,000,000 to expand the production capacity for stainless steel is being undertaken by Samuel Fox & Company, Limited, a subsidiary of the United Steel Companies, Limited. Present production at Stocksbridge is over 1,000 tons a week. Recently, Samuel Fox announced a £1,000,000 project to modernize their Stocksbridge hot mill which, by the middle of 1960, will enable them to produce sheets and plates up to ¼-in. thick and 6-ft. wide.

GARDNERS, LIMITED, of Patricroft, near Manchester, received orders during the month of November for over 350 automotive engines, LWs and 6LXs, from leading chassis manufacturers in this country. Orders were also secured for 84 rail traction engines, of which 68 were for use in South Africa. Many marine-propulsion engines were also ordered and over 100 engines for installation in earth-moving machinery, trenchers, air compressors and other road-making machinery.

SHEFFIELD UNIVERSITY'S third business-studies course for future senior executives in industry, commerce and public service will begin in June 1960. It will take place at Stephenson Hall in six successive University vacations, ending in April 1962. There are six residential sessions of a fortnight each and they are designed to provide short periods of intensive work with interchange of ideas between members, without taking men away from their firms for more than two weeks at a time.

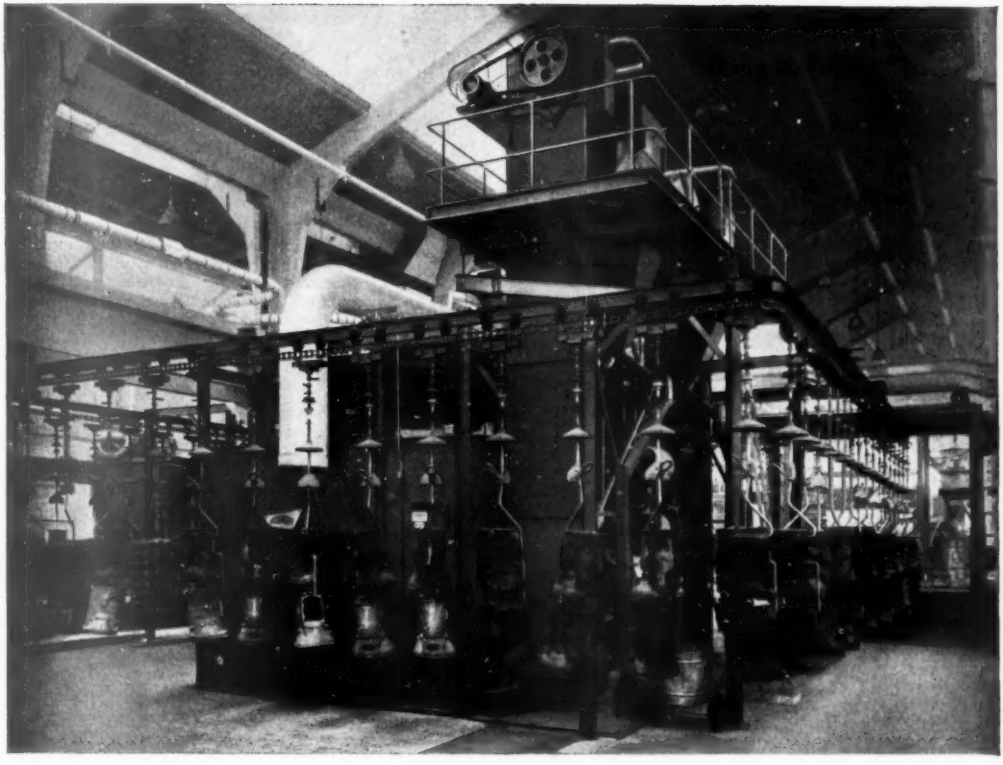
THE MINISTER OF HOUSING AND LOCAL GOVERNMENT, Mr. Henry Brooke, is to meet the Sheffield and District Clean Air Committee to discuss the control of Sheffield's atmosphere. In his last proposals before Parliament's summer recess, the Minister proposed a partial control of furnaces up to a certain tonnage by the Sheffield Corporation, and excluded larger furnaces from their

(*Continued on page* 688)

TILGHMANS LIMITED

Overhead Monorail Conveyor Cleaning Plants

at Sterling Metals Ltd., Nuneaton



The illustration shows one of two overhead monorail conveyor cleaning plants installed at Messrs. Sterling Metals Ltd., Nuneaton. The machines are engaged in cleaning automobile component castings which pass through the 23ft. by 13ft. 6in. by 10ft. high cabinet and are thoroughly blasted by four centrifugal shot blast wheel units.
Tilghman's are experts in building shot cleaning plants for every type of work, and would be pleased to advise you on any application. Consult us about that special plant for your particular problem.

TILGHMAN'S LIMITED BROADHEATH ALTRINCHAM CHESHIRE

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Stewart Industrial Services Ltd., 129 Ormeau Road, Belfast.

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News in Brief

(*Continued from page* 686)

control. Since then, Sheffield Corporation has asked for even greater powers in the matter, while industry is opposed to them.

THE YORKSHIRE DIVISION of the Central Electricity Board is to open a training school at Doncaster power-station for staff of future nuclear power-stations. Apprentices will be trained not only in the operation of coal-fired power-stations, but in the maintenance, operating and managing of nuclear stations. The first intake of trainees will start a sandwich course preparing them for a diploma in electrical engineering to university degree standard, and ultimately membership of the Institution of Electrical Engineers. A second training school is to be opened at Leeds.

AN ORDER for a £1,000,000 bulk carrier of 15,000 tons dw. has been placed with Lithgows, Limited, Port Glasgow, by A/S Kristian Jebsens Rederei, of Bergen, Norway. Lithgows state that the order had been obtained in fierce competition with foreign shipyards and at a very keen price. This order is only the second foreign contract to be obtained by British shipyards this year. The first also went to a firm of the Lithgows group, the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow, and was for nine ferries, valued at £3,500,000, for Turkey.

SUBJECT TO NEGOTIATIONS being satisfactorily completed with the owner of the property, the Northern Aluminium Company, Limited, of Britain, will erect a £2,250,000 aluminium fabricating mill at Wiri, about 15 miles south of Auckland, New Zealand. The company hopes to start construction early in the new year. Plans of the proposed plant were presented to the Manukau County Council with request for permission to build, and although permission was given in principle, confirmation was withheld until the Council was satisfied there would be no fumes nuisance.

A TRADE IN OLD GAS LAMPS from Sheffield is being built up with the United States. After a woman from California had taken two back with her from the Sheffield lighting department headquarters last summer, she sent an order for 75 more. She wrote to say that they were being used not only for lighting, but also as hanging containers for indoor trailing plants, bird cages, and even made water-tight to keep goldfish in. The department also sells some lamps locally. They are sold for scrap value and the three sizes cost between £2 5s. and £2 10s. each. There are still about 9,000 gas lamps being operated by the department but they will be gradually replaced.

A REVISED BRITISH STANDARD for the general dimensions of twist drills (B.S. 328: Part I 1959) will become effective from January 1. The new standard will conform to ISO recommendation No. 301. After many years of study, technical committee No. 29 of the International Standards Organization, on which 14 countries are represented, has reached agreement on recommended flute and overall lengths for standard types of twist drills. In comparison with existing national standards, British, American, German, French, etc., the new ISO recommendation has a more systematic diameter to flute-length ratio, given a more balanced relationship between diameter and flute lengths.

MIDDLESBROUGH will become a complete smoke-control area during the next 20 years on a plan approved by the Middlesbrough sanitary and baths committee. In addition to the use of smokeless fuel by industry, it will mean that fireplaces in 44,000 houses will be converted for smokeless fuel at a cost of about £750,000. This is expected to cost the Corporation £274,000 after Exchequer grants have been received. The first smokeless zone, in the Beechwood area, will come into operation next May, and in the next five years other residential parts of the town will become smoke-control zones. It was recently estimated that in the worst part of Middlesbrough, 440 tons of soot falls on each square mile every year.

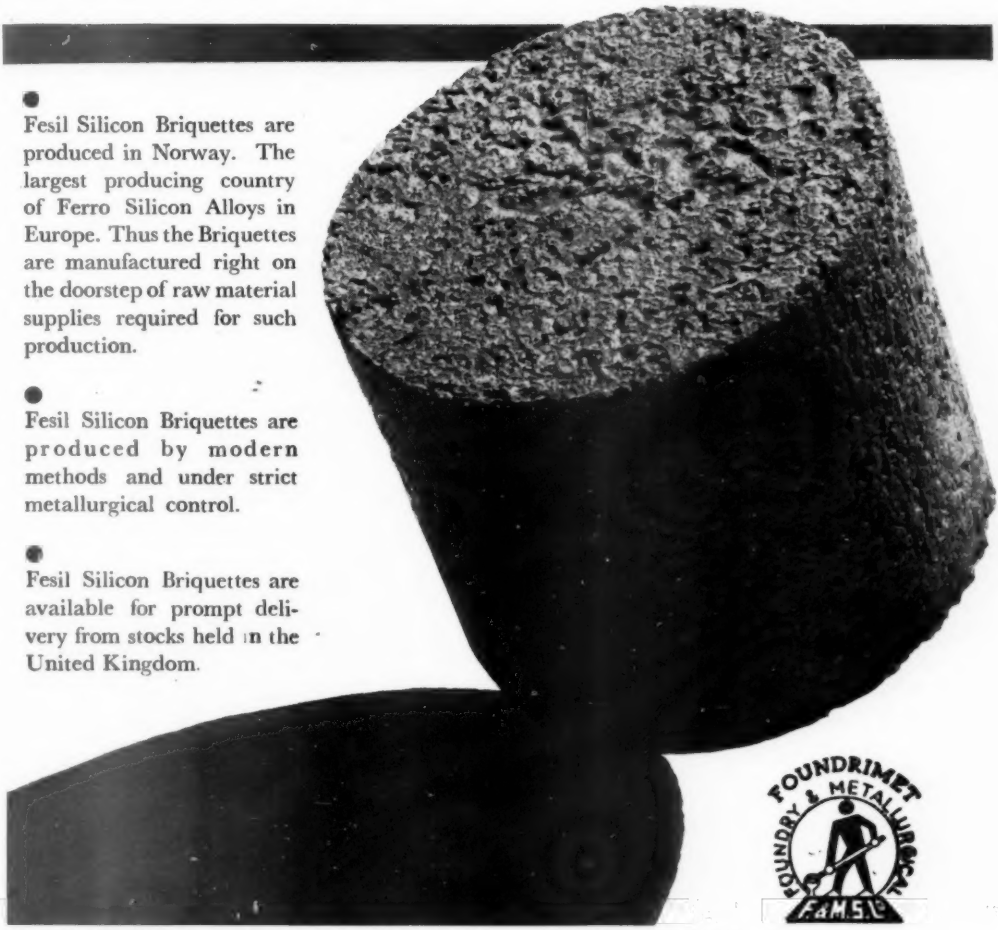
P. G. ENGINEERING, LIMITED (member of the Power-Gas Group), Stockton-on-Tees, has received instructions from the North Eastern Gas Board to build a plant, at the Whitby Gasworks, to reform natural gas. The installation will be the first of its kind for this application in this country. The plant will comprise three two-tube P. G. Hercules furnaces (two working and one standby) and will be designed to produce a total of 1,250,000 cub. ft. of town gas per day. The natural gas will be obtained from wells on the nearby North Yorkshire Moors and, in the event of failure of this supply, the plant will also be capable of producing town gas by the reforming of commercial butane. The plant is due for completion by July, 1960.

THE PURCHASE by Firth Cleveland, Limited, of Broadmead, Limited, as from January 4 1960, is announced by Mr. Charles W. Hayward, chairman and managing director of the former company. Broadmead, Limited, consists of approximately 300 retail branches throughout England, Scotland and Wales, dealing in radio, television, electrical and domestic appliances. Mr. John James, chairman of Broadmead, Limited, joins the board of Firth Cleveland, Limited. As a result of this acquisition Firth Cleveland now controls the largest chain of this kind in the world, with nearly 500 branches. The purchase price for Broadmead's was £5,800,000 of which half is payable in cash and the balance by the allotment of 2,416,667 4s. ordinary shares in Firth Cleveland.

PROFESSOR J. NUTTING, senior lecturer in the Department of Metallurgy at Cambridge University, gave the Christmas Lecture to schoolchildren organized by the Birmingham Section of the Institute of Metals. There was an audience of over 600. Professor Nutting who showed specimens of uranium; a brass axehead dated *circa* 1,000 BC, and types of metal containers specially made to hold uranium, told his young listeners that there were tremendous problems in metallurgy but "they made life interesting." He appealed to the young people to consider becoming metallurgists. "The main requirement is for more men, men with very great imagination to see where these problems are and with skilled hands to carry out experiments," he said. "Then, when we have solved some of them, we need men with great skills to put the various devices and inventions into service."

EARLY IN 1960 the Industrial Safety Division of the Royal Society for the Prevention of Accidents will begin its part in an international scheme intended to promote wider understanding of industrial safety and allied subjects. The essential aim of this scheme is to make information available on literature and legislation dealing with all aspects of occupational safety and health. Distribution of the information will be made through the International Labour Office by means of index cards. The cards, each with a classification code number, will consist of a complete index of subjects and cross references, and each item of information will appear on only one card. Cards will be obtainable, in complete sets only, from the national organizing centre which, in Great Britain, will be the Royal Society for the Prevention of Accidents, Artillery Mansions, 75, Victoria Street, London, S.W.1.

FESIL SILICON BRIQUETTES



- Fesil Silicon Briquettes are produced in Norway. The largest producing country of Ferro Silicon Alloys in Europe. Thus the Briquettes are manufactured right on the doorstep of raw material supplies required for such production.

- Fesil Silicon Briquettes are produced by modern methods and under strict metallurgical control.

- Fesil Silicon Briquettes are available for prompt delivery from stocks held in the United Kingdom.

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Raw Material Markets

Iron and Steel

Many of the ironfoundries were closed for the Christmas holiday from Wednesday of last week until Monday or Tuesday of this week. Apart from the raw materials which are received by road, there was generally no suspension in deliveries owing to the present stringency in some supplies. Chief among these is the low-phosphorus pig-iron mainly used by the engineering and speciality foundries, as, on account of the scarcity of this grade of pig-iron, the foundries are anxious to obtain all available supplies. The demands made on makers of other brands of low-phosphorus irons are increasing daily, and in most cases orders on hand exceed production, with the result that they are committed for some weeks ahead. As stocks previously held by the furnaces have been entirely eliminated or considerably reduced, deliveries depend mainly on current production and this results in delays in despatch. Increased furnace capacity is expected to be brought into operation during this month and early next year, when three more furnaces are due to be burdened for the production of low-phosphorus pig-iron, and this should ease the present difficult supply position.

Most of the engineering and speciality foundries have heavy commitments for high-duty castings which call for substantial tonnages of the low-phosphorus irons, and, in addition, their demands for hematite have increased considerably recently, while a heavier call is also being made for the refined irons. Producers of basic pig-iron are receiving heavier demands for supplies from the steelworks, and these are being met satisfactorily from the increased outputs which are now being obtained.

There is no difficulty in securing adequate tonnages of the high-phosphorus pig-irons. Although demands for this grade are maintained at better levels, producers are able to cope with these and there are tonnages to spare both from stock and current outputs. Consignments continue to be shipped to overseas buyers and this is relieving the furnaces of some of their excess tonnages. Many of the light and jobbing foundries maintain their improved outputs of castings, and this has enabled them to take up larger tonnages of pig-iron.

There is a strong demand from the foundries for suitable parcels of both cast iron and steel scrap, with a persistent call for the better and heavier grades of cast-iron scrap. Deliveries of foundry coke are satisfactory, and ganister, limestone, and firebricks are available on demand.

The re-rollers have plenty of work on hand and there continues to be a good demand for all their products. Business is at a high level for small bars and light sections, and the mills supplying reinforcing bars are heavily committed. The chief anxiety of the re-rollers at present is to secure sufficient steel semis to enable them to implement the work on hand. They hold only meagre stocks and difficulty is being experienced in obtaining their full requirements of steel billets, blooms, and slabs for consumption and stock. Home steelworks are under heavy pressure for supplies and most of the steelworks have commitments which will absorb their total outputs for two or three months ahead.

Non-ferrous Metals

Although a number of agreements have been concluded between US copper producers and the Mine, Mill and Smelters' Union, production at these mines has not been resumed. This lack of follow-through on the reported settlement of some of the strikes has made for cautious markets, which have yet to react to the full implication of an overall settlement. Meanwhile, in London the market is firm with cash metal still commanding over £16 a ton on three months' material. Part of this firmness can be attributed to the fact that when the US customs smelters recently returned to the New York market they raised their quoted price by 2 cents to 35 cents a pound. Producers are still quoting 33 cents a pound.

Overall, however, the high price quoted in London is due to the still not clear position with regard to the US copper strike situation and, in consequence, the shortage of metal. Another bullish factor which has reared its head this week has been the news that rock-breakers at Mufulira, on the Rhodesian Copperbelt, have imposed a ban on overtime. The outlook should be a good deal clearer this time next week. It will be interesting to see how markets react when the US copper strike is settled and production resumed on a broad front.

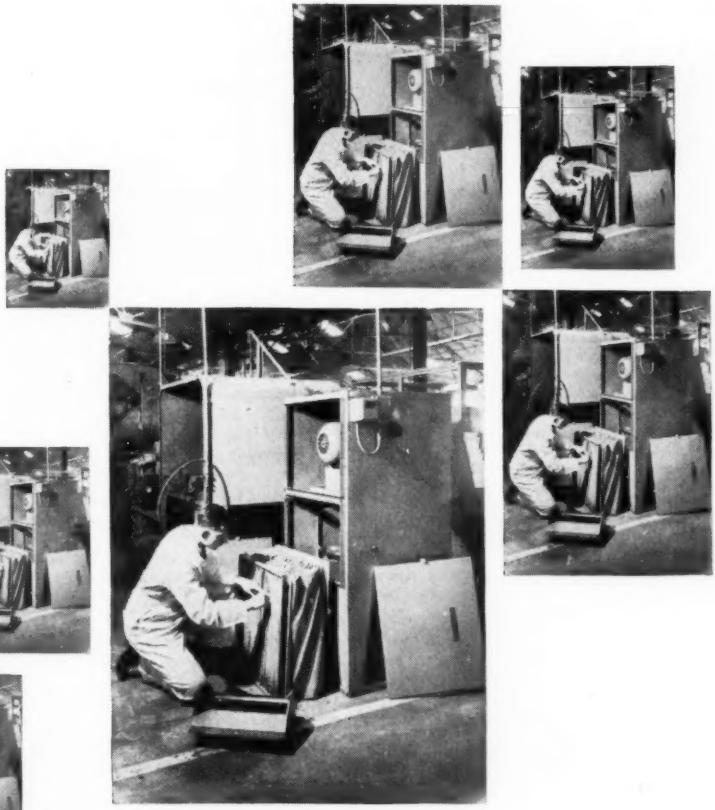
Tin has been an unsteady market in London, in Singapore, and in New York, where the price is less than 99 cents a pound. Demand on both sides of the Atlantic is desultory and stocks in London are rising. At the end of last week stocks of refined tin in LME warehouses rose 193 tons to 8,527 tons.

Lead is enjoying good trading conditions and the turnover in London is now reminiscent of that achieved in early November. The London price for cash metal is now around £74 a ton, while in New York the spot price is reasonably firm at 12 cents a pound. Zinc is a better market in New York than in London, where the offer from the Board of Trade to dispose of 3,000 tons from its stockpile has led to a decline in the cash and three months' quotation. However, prompt material is relatively scarce and the backwardation is approximately £5 a ton. The US price is still called 12½ cents a pound, East St. Louis.

Distington Foundry's Record Output

The iron foundry of Distington Engineering Company, Limited, a subsidiary of the United Steel Companies, Limited, produced 2,423 tons of finished castings during the week ending December 19. It is claimed that this sets up a new works', national and European record for one week's output from one iron foundry. The castings produced consisted of 379 ingot-moulds, in addition to a number of bottom-plates, slag ladles and general engineering castings. This achievement follows that of three previous weeks in each of which output exceeded 2,000 tons. Distington's iron foundry is working a 17-shift week, and the commissioning of a second hot-blast cupola, with continuous tapping, makes available a full week for furnace maintenance, as one furnace in blast at a time is proving sufficient to meet all the iron required for a week's production. The company's management state that the foundry order-book is very satisfactory, and there is every confidence that the large demand which this record output reflects will continue well into 1960.

THE NEXT quarterly general meeting of the National and Midland Ironfounders' Association is to be held at the Station Hotel, Dudley, on Wednesday, January 13. In addition to normal agenda, a lecture will be given by Mr. D. A. Taylor (of the British Cast Iron Research Association) who will talk on the subject of shell moulding.



Look after the dust collectors—and the machinery will look after itself *(old Dallow Lambert proverb)*

If you have Dallow Lambert unit dust collectors in your factory, you can make sure they stay as efficient as they were the day you bought them by taking advantage of our Maintenance Service Scheme. This scheme, for which we make a small charge, provides for a service engineer to come round at least twice a year and thoroughly inspect your dust control equipment, making any repairs and replacements that may be necessary. This ensures that the equipment will continue to collect the dust produced by your machines, so that they can run with maximum efficiency and safety. It will also help to satisfy H.M. Inspector of Factories that you are doing your best to safeguard the health of your workers.

If you would like to know more about it, please complete this coupon and send it to us

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I am interested in your Unit Dust Collector Maintenance Service Scheme: *I would now like*

further details by post ☐ a representative to call ☐

information about your range of products ☐

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Tel. No. .....

For the attention of .....

. . . . see us for dust *DALLOW LAMBERT* . . .

CRC 86

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

December 30, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron). Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 10s. 0d. to £44 0s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 0s. 0d. to £62 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 11s. 7d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 14s. 7d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £78 10s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £77 0s. 0d. to £80 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent, C,* 1s. 8½d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t.s. 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

* Average 68–70 per cent.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £258 0s. 0d. to £258 10s. 0d.; three months, £241 0s. 0d. to £241 10s. 0d.; settlement, £258 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 6½d. per lb.; rods, 278s. 6d. per cwt. basis; 20 s.w.g., 313s. 0d. per cwt.

Tin.—Cash, £785 0s. 0d. to £786 0s. 0d.; three months, £782 10s. 0d. to £783 0s. 0d.; settlement, £786 0s. 0d.

Lead (Refined Pig).—Second half December, £73 17s. 6d. to £74 0s. 0d.; second half March, £73 5s. 0d. to £73 10s. 0d.

Zinc.—Second half December, £95 7s. 6d. to £95 10s. 0d.; second half March, £90 0s. 0d. to £90 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £131 0s. 0d.; rolled zinc (boiler plates), all English destinations, £128 15s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £107 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 1d. per lb.; sheets to 10 w.g., 223s. 9d. per cwt.; wire, 2s. 10¾d.; rolled metal, 223s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £167; B6, £219.

Brass (High Tensile).—BS1400, HTB1, £198; HTB2, £218; HTB3, £230.

Gunmetal.—BS1400, LG2, £209; LG3, £219; G1, ½%, £274; G1, 1%, £261.

Phosphor Bronze.—BS1400, PB1 (AID released), £308; BS1400, 90/10/1, £288.

Leaded Phosphor Bronze.—BS1400, LPB1, £230.

Phosphor Bronze Strip, etc.—Strip, 315s. 6d. per cwt.; wire, 4s. 3¾d. per lb.; rods, 3s. 7d.; tubes, 3s. 7d.; chill cast bars; solids 3s. 6½d.; cored 3s. 7½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 0d. per lb.; round wire, 10g in coils (10 per cent.), 4s. 5d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 4d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 0d. to 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 10s. 0d. to £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £256; AB2, £266.

New Catalogues

Pyrometers. A leaflet, No. P.16, received from the Cambridge Instrument Company, Limited, 13, Grosvenor Place, London, S.W.1, describes a simple type of thermocouple for attaching to a pipe for measuring a range of temperatures (up to 300 deg. C.) of materials carried. It suggests itself as being suitable for hot-blast experiments in various types of furnaces, though it is shown applied to space-heating systems.

Bunker Cushions. Orthos (Engineering), Limited, 62, Coventry Road, Market Harborough, Leics., have issued a German catalogue, printed in English, originating from Clouth of Cologne. It deals with the question of material sticking in bunkers and hoppers. The solution offered is the insertion in the side of the hopper of rubber pads, inflatable by compressed air. To say the least, the proposition is not without interest to operators of mechanized foundries, where the supply of sand to the machine-moulders is liable to be interrupted.

Paddle-blade Fans. Catalogue No. 2M/ANH/1159 issued by the Midland Heating & Ventilation Company, Limited, Bedford Road, Birmingham 11, covering the Gyro-Flo type of paddle-blade fans, first discusses four typical mountings and follows with a performance correction table for when the fans are used at high altitude or high temperatures. The bulk of the catalogue is taken up with tables giving technical data, in great detail for 18 sizes of fans in which the impeller diameter increases in steps from 9½ in. to 60½ in. It is the type of catalogue that a buyer should keep in his library for reference.

Heat-treatment Furnaces. In folder No. M.4B, Metalectric Furnaces, Limited, Smethwick, Birmingham, describe and illustrate a range of standard box-type electric furnaces. They are made in four sizes, with ratings of 10-, 16-, 27-, and 42-kw., the operating range being up to 1,000 deg. C. An interesting feature is that the hearthplate is cast in the firm's own works from a nickel/chrome alloy. Special-purpose furnaces are available, with temperatures running up to 1,200 deg. C. and for these ceramic hearthplates are used.

Electric Cranes. Herbert Morris, Limited, Loughborough, have issued as a separate publication Section 10 of their general catalogue, which covers a wide range of electric cranes, reaching up to 200 tons lifting capacity. The first part of this well-produced brochure tells some of the places where they are made and how they are built. The second part illustrates actual installations, segregated into various weight-lifting capacities. Those of up to 20 tons capacity are shown as cage- and floor-operated. Included in the illustrations are several applications in foundries and steelworks.

Epoxide Resins. Bakelite Limited, 12-18 Grosvenor Gardens, London, S.W.1, have issued a new booklet entitled "Bakelite Epoxide Resins and their Applications" which outlines some of the uses of the comprehensive range of epoxide systems they market. The booklet is intended for use in conjunction with the large number of "advance information sheets" and "technical memoranda" already issued on specific applications of Bakelite epoxide systems. In this connection, the chart entitled "Guide to Publications on Bakelite Epoxide Resins," will be found useful.

PIG IRON
Low Phosphorus
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Liverpool, 2. 13, Rumford Street. CENTRAL: 3558
Glasgow, C.2. 93, Hope Street. CENTRAL: 9969.

CLASSIFIED ADVERTISEMENTS

PREPAID RATES: Fifteen words for 7/6 (minimum charge) and 4d. per word thereafter. Box Numbers 2/6 extra (including postage of replies). Situations wanted 2d. per word throughout.

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

AVAILABLE early January. Well known Steel Foundry SUPERINTENDENT. Age 38. Capable full control. Expert in use of air setting oils. Box AE287, FOUNDRY TRADE JOURNAL.

FOUNDRY SUPERINTENDENT, Australian, 29, with wide experience in Australian malleable, grey iron and electric steel founding industry, together with US experience, seeks management position in UK in similar industry. Box FS307, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

TECHNICAL SALES REPRESENTATIVE required for Iron Foundry situated N.E. Applicants must have knowledge of Iron Founding and sales experience, hold current driving licence, age preferably under 35 years. Only those with the necessary qualifications need apply, with full details of experience and salary to:—Box TS304, FOUNDRY TRADE JOURNAL.

JUNIOR FOREMAN required in large South Wales Iron Foundry. Duties will include the supervision and training of apprentices and young moulders in greensand, drysand, and loam moulding. Applicants should have a wide knowledge of these methods as applied to the production of large high quality iron castings. Write giving details of experience, age, etc., to Box JF308, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required for well established and expanding Whiteheart Malleable and Cast Iron Foundry near Wolverhampton. Important post requiring an experienced and first class production man for both bench and mechanised moulding. Applicants must be good at organising, trained in cupola and sand control, fully capable of estimating from drawings, used to working on own initiative, not afraid of work and responsibility. Applications for this pensionable position will be treated in the strictest confidence. Reply, stating salary, Box FM313, FOUNDRY TRADE JOURNAL.

CHIEF FOUNDRY METHODS ENGINEER

Required for Steel Foundry in Scotland, producing castings up to 10 tons. This position calls for a man having wide experience in the application of modern steel foundry techniques and in the running of a Methods Department. The post is regarded as an important one, and a salary commensurate with experience will be paid. Assistance with housing will be considered. Pension Scheme in operation. Applications, in writing, should give details of experience, age, education, etc.

Box No. CF.217, Foundry Trade Journal

SITUATIONS VACANT—*contd.*

FOUNDRY ENGINEER and DESIGN DRAUGHTSMAN required by Coleman—Wallwork Foundry Equipment Division of Stone—Wallwork Ltd. Applications giving full details of previous experience to be submitted to 32, Victoria Street, S.W.1.

WANTED. A practical ROLLMAKER to take complete charge of a Roll Foundry making Straight Carbon, Molybdenum and Indefinite Chill Rolls also Hollow Rolls. Reply giving full particulars of experience and qualifications also stating salary required. Box AP309, FOUNDRY TRADE JOURNAL.

JOSEPH LUCAS (ELECTRICAL) LIMITED

have a vacancy for a

PROCESS DEVELOPMENT TECHNOLOGIST

to take charge of a department responsible for the development of improved processes and techniques for the control of pressure diecasting conditions. Experience of diecasting is desirable but not essential.

Applicants should preferably have a degree or equivalent qualification in science, engineering or metallurgy. The post is pensionable and a good starting salary will be paid.

Apply in writing, stating age, qualifications and experience to the Personnel Manager, JOSEPH LUCAS (ELECTRICAL) LIMITED, Great King Street, Birmingham, 19, quoting reference PM/D/355.

WORKS STUDY ENGINEER: Applicant should possess necessary education, qualifications, good personality and ability to get along with men, preferably, though not essential, backed up by several years' experience in application of method study, work measurement and incentive schemes. If Anne Shaw organisation trained, an added advantage.

Knowledge of basic principles underlining incentive schemes and standard costs desirable. Able to show evidence of ability, to analyse production problems objectively, and carry assignments to successful conclusion.

Pioneering post in progressive major manufacturing company situated in pleasant area within easy access of Central London, and operating latest equipment. Knowledge of its application to engineering, foundry and enamelling industry particularly desirable.

Training course could be made available to suitable candidate.

Position permanent. Pension Scheme facilities.

Applications will be treated in absolute confidence. Address full details, age, education, position held and salary earned to DIRECTOR AND GENERAL MANAGER, BATH DIVISION, ALLIED IRONFOUNDERS, LTD., Greenford Middlesex.

SITUATIONS VACANT—*contd.*

METALLURGICAL CHEMIST and a MELTER with manganese steel experience for Rhodesian electric steel foundry. Box MC311, FOUNDRY TRADE JOURNAL.

STEEL FOUNDRY MANAGER

BROWN, LENOX & CO. LTD., require a MANAGER for their Steel Foundry at Pontypridd.

Applicants must be experienced in the manufacture of Carbon and Medium Alloy Steel Castings up to 3 tons in weight, and in all aspects of foundry management.

Age 40-45. Pension Scheme. House Available.

Apply with full particulars to the Managing Director,

BROWN, LENOX & CO. LTD., Pontypridd, Glamorgan.

PROJECT ENGINEERS. The Stanton Ironworks Company, Limited, near Nottingham, has vacancies for two Project Engineers for work at its Spun Iron Pipe plants. Applicants should be graduate engineers or hold equivalent qualifications and preferably be aged between 25 and 30. The posts are permanent and pensionable. The engineers selected will be engaged initially on work at Stanton but may ultimately be required to work overseas. Preference will be given to those prepared to travel abroad. Write, in confidence, to the STAFFING OFFICER.

MACHINERY WANTED

WANTED. Room Type Shot Blast Plant. In good second hand condition. Approximately 12 ft. × 8 ft. × 8 ft. complete with Dust Extractor, etc. QUALTERS & SMITH BROS. LTD., Barnsley, Yorks.

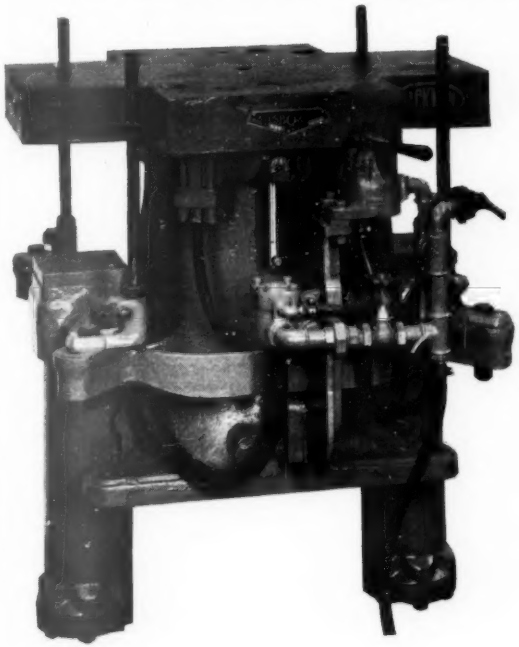
URGENTLY WANTED—One pair Cupolas with Charging Hoist and Sp.A. 4 ft. 6 in. to 6 ft. Shell Dia. Wheelabrator. HPL 1 Moulding Machines. No. 1 and 2 Sand Rovers. Sandmills, 3 ft.—6 ft. Dia. Geared Ladles, 30 cwt. to 5 ton. FRANK SALT & Co., LTD., Station Road, Blackheath, Birmingham.

FOUNDRY Sand Testing Equipment required particularly for green strength and permeability. Must be in good condition.—Box FS285, FOUNDRY TRADE JOURNAL.

WANTED.—LABORATORY type sand mill batch quantity approximately 20 lbs. DRAKES, LTD., Shay Lane, Halifax, Yorkshire.

WANTED — FORDATH Multiple Rotary Core Machine or one similar with dies, coreplates, etc. Good condition.—RICHARD THRELFALL, LTD., Bridgeman Place Works, Bolton.

JACKMAN-BUILT OSBORN MOULDING MACHINES



FROM OUR WIDE RANGE OF MANUALLY OPERATED AND AUTOMATIC MOULDING MACHINES AND CORE BLOWERS WE SHOW:—

THE No. 539 JOLT STRIP MOULDING MACHINE WHICH HAS A VERY ACCURATE DEEP DRAW. THE DRAW IS HYDRAULIC (AIR ON OIL) WITH AUTOMATIC ACCELERATION FROM SLOW TO FAST.

LENGTH AND SPEED OF BOTH SLOW AND FAST DRAW ARE ADJUSTABLE THROUGH A SINGLE REGULATING VALVE.

	No. 539	No. 540
Table Size	25″ x 33″	29″ x 38″
Draw Stroke	12″	12″
Jolt Cyl. Dia.	7″	9″
Jolt Capacity at 80 lbs. p.s.i, pressure ..	1,200 lbs.	2,000 lbs.
Height of Table above Floor	27″	27″

THE No. 275 J-1 CANTILEVER TYPE JOLT SQUEEZE MOULDING MACHINE FOR USE WITH MATCH PLATES OR SINGLE SIDED COPE AND DRAG PATTERNS.

	No. 275 J-1	No. 276 J-1
Table Size ..	16″ x 20″	17″ x 26″
Squeeze Cyl. Dia. ..	10″	13″
Jolt Cyl. Dia.	3½″	4″
Squeeze Stroke ..	5″	6″
Jolt Capacity at 80 lbs. p.s.i. pressure	400 lbs.	500 lbs.

DESIGNED FOR EASE OF OPERATION, THESE MACHINES WILL GIVE DEPENDABLE SERVICE UNDER THE MOST ARDUOUS CONDITIONS

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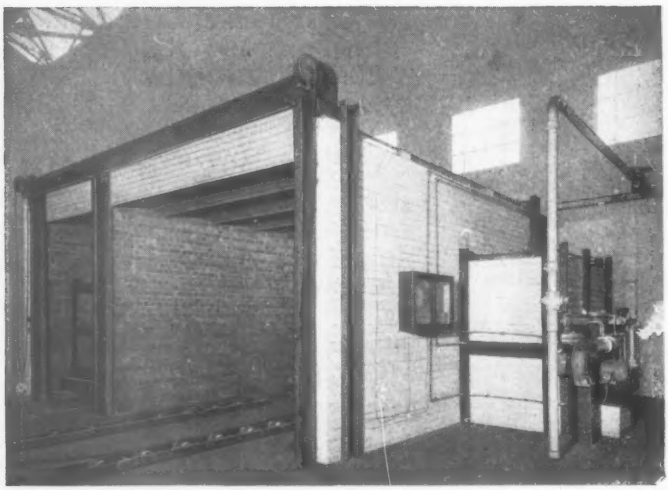

" NEWSTAD " Core and Mould Drying Stoves gas-fired

Photo by courtesy of Messrs. John Hill & Son (Ironfounders) Ltd. (Branch of the Staveley Group)

Economical and constant performance ensured by automatic control and full safety protection. Clean and highly efficient in operation. These stoves combine the advantages of our well-known Newstad recirculation system with full automatic temperature control, flame failure and electrical failure protection, and conform to all the requirements of the regulations governing foundry conditions. Also available " Junior " small oil-fired portable Mould Dryer, Sand Dryers, etc.

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Sand Testing Equipment

Routine checking of moulding and core sand properties is essential and guarantees improved surface finish of castings, fewer rejects and economical use of sands. **The production of quality castings begins with sand testing.**

Our illustration shows +GF+ Sand Testing Equipment in use in the laboratories of the Ford Motor Co. Ltd., Dagenham.

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Easy handling - reliable test results - pleasing appearance

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George Fischer Limited, Schaffhausen, Switzerland

Better finish at Lower Cost with

SHELL

IPS 1 or IPS 2

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IPS 2 min. 85% by wt. isopropyl alcohol

All Foseco 'fired' dressings contain Shell I.P.S. That is one of the reasons why they achieve such consistently good results. Shell I.P.S. is the ideal solvent for use in inflammable mould and core dressings. It is available in two grades to the Foundryman who prefers to make up his own dressings.

The International Foundry Service

Foseco

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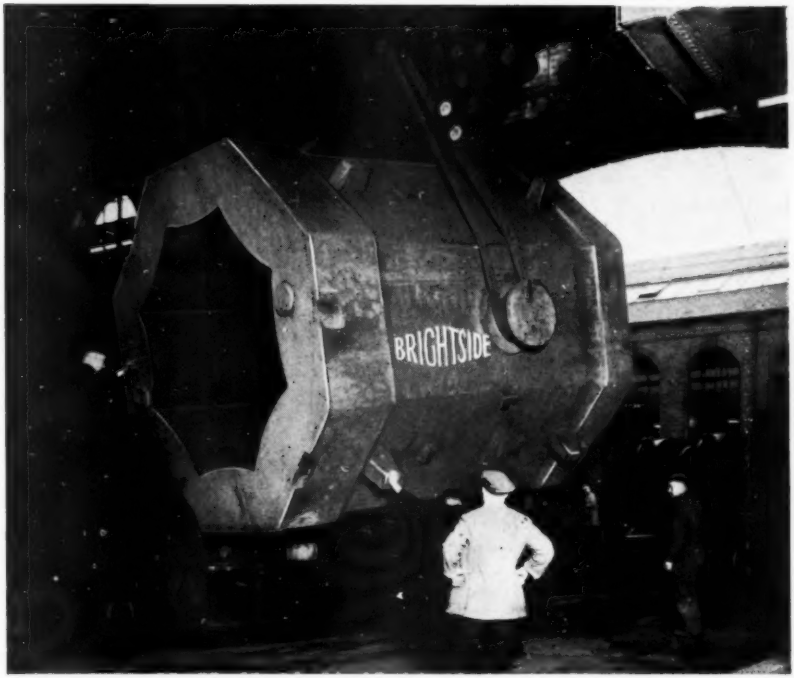
Sole distributors of I.P.S.1 and I.P.S.2 to the Foundry Industry in the United Kingdom and Republic of Ireland for Shell Chemical Company Limited.

Another Perfect Strip

Using "DURRANS" No. 10 Prepared Blacking



130 ton Ingot Mould is re-produced by kind permission of The Brightside Foundry & Engineering Co. Ltd.

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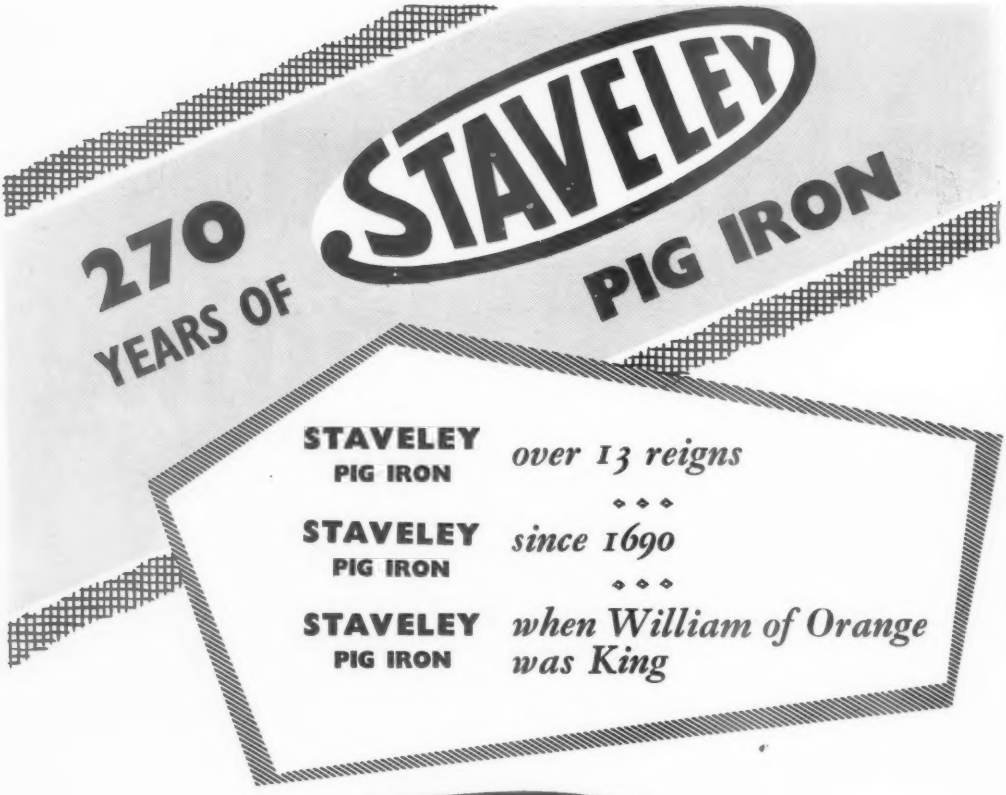

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PIG IRON *now...*

... meeting the needs of the 20th Century with a modern range of materials for all industrial purposes.

The unrivalled Staveley Technical Service, built on long experience, is at the disposal of present and potential users to assist in all foundry problems.

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Exoberk PRG 20

in the steel works

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This 18-cwt. Manganese Steel ingot was fed by Berk Exothermics PRG 20 Grade and, on sectioning back, a 4·5% discard showed complete soundness. By using our hot tops you, too, can achieve maximum yields.

Literature and samples backed by first-class technical service are available on request.

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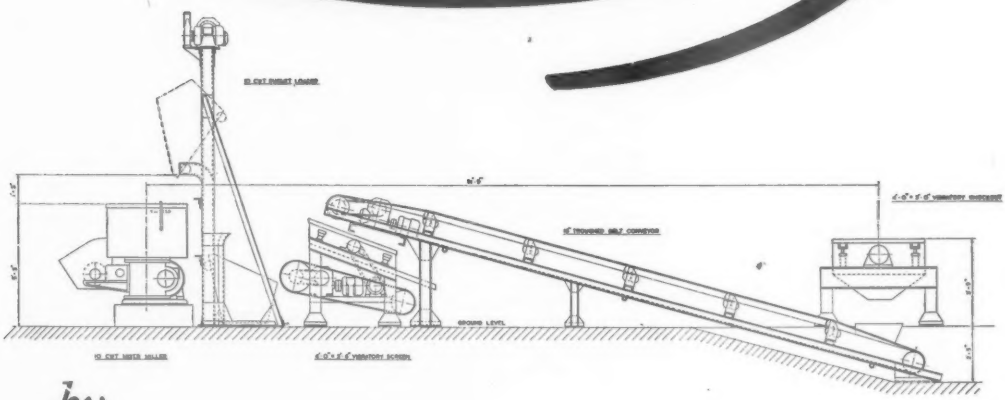
producing **5** *tons per hour*



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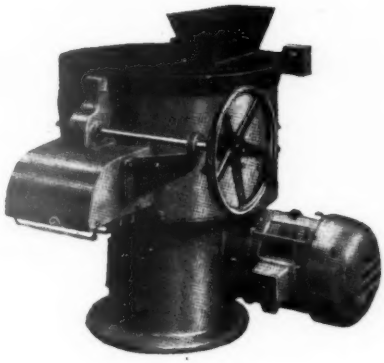

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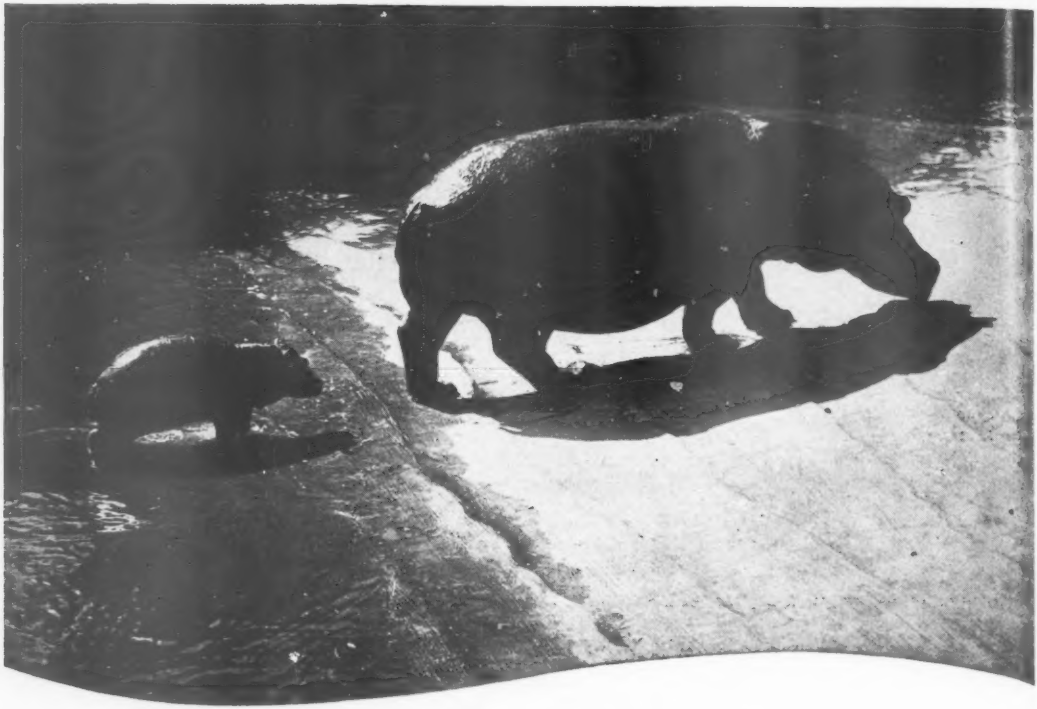

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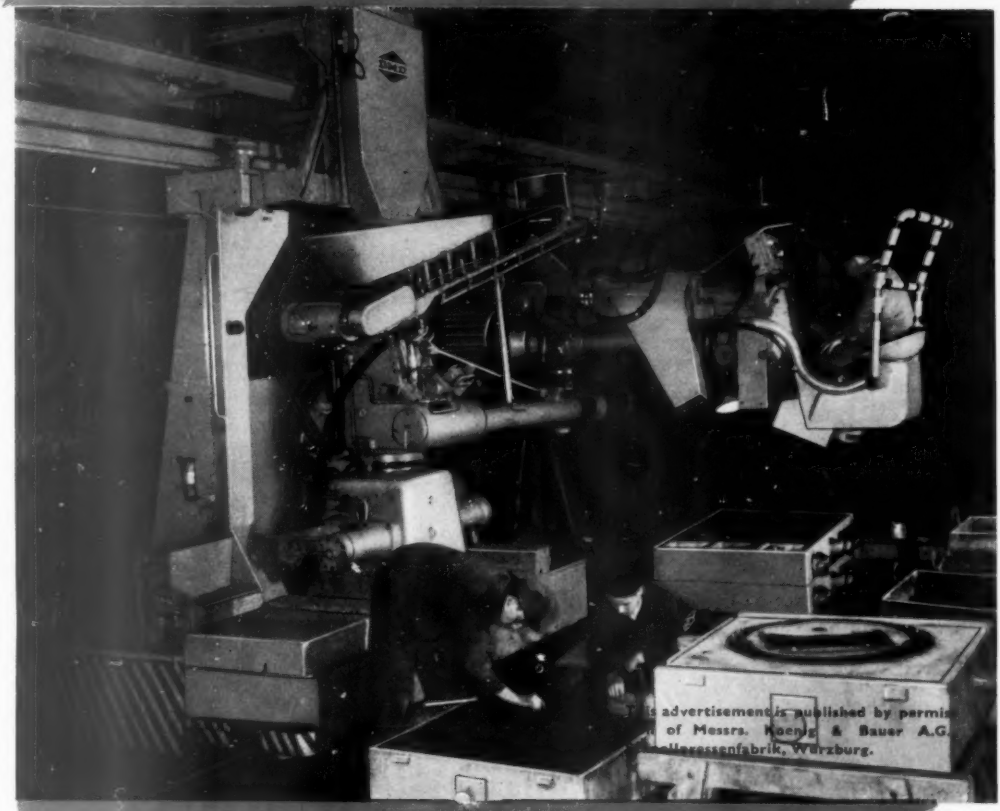

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These are illustrated, the second Cupola from the left is " blowing " —note the complete absence of dark smoke, sure proof of efficiency.

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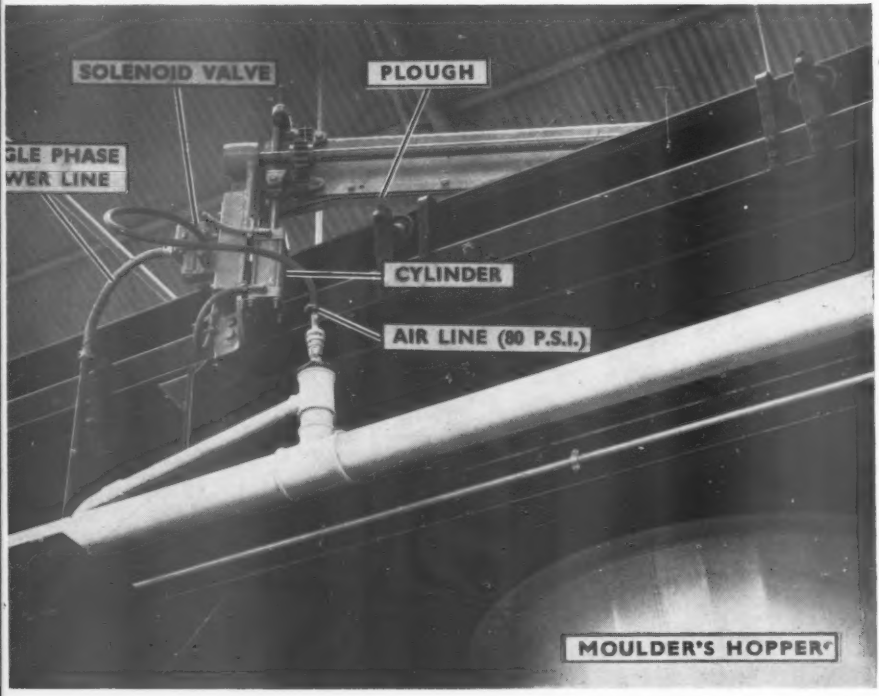

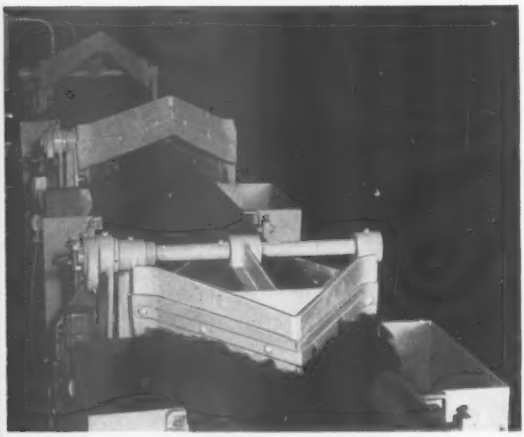

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Foundry Equipment Limited,
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Bedfordshire.

May 12th, 1958.

Dear Mr. Beech,

Automatic Sand Ploughs.

We are extremely pleased with the performance of your Automatic Sand Plough installation at our Lincoln Works, Messrs. Harrison & Co., (Lincoln).

The sensitivity of operation is impressive, and the installation has entirely eliminated labour on sand distribution to our automatic moulding line.

The total throughput of sand for a given speed of mould output can be reduced, solely due to the greater degree of precision of plough control above that which it is possible to achieve with an experienced attendant. From our experience of electronic equipment and also of solenoid valves made by one of your Associates and operating under foundry conditions we foresee trouble free performance.

We are pleased to be able to tell you that based on our experience at Harrisons, we have decided to install this equipment in our new mechanised foundry at Derby, and are considering its possible application to another existing mechanised plant.

Yours sincerely,

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Managing Director.

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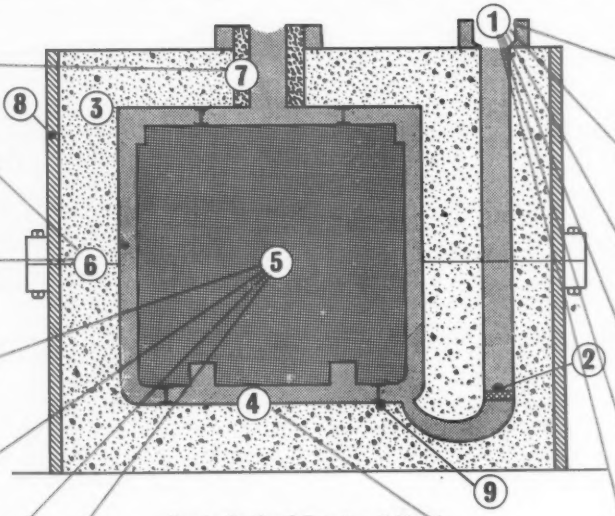

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Key to Sectional Drawing of Mould

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1	Metallurgical Control use of Fluxes.	3
2	Clean Metal by using Ceramic Strainer Cores and Discs.	4
3	Coal Dust additional to Facing and Backing Sand.	1
4	Silverskin Blackings, Plumbago and Mould Dressings.	1
5	Cores using Crulin and Crudol Core Binders (Oil Bonded, Air Setting Cereal or CO.2 Binders).	2
6	Moulds Parted with Beecro Silica Free Parting Powder or Beecrol Parting Liquid.	1
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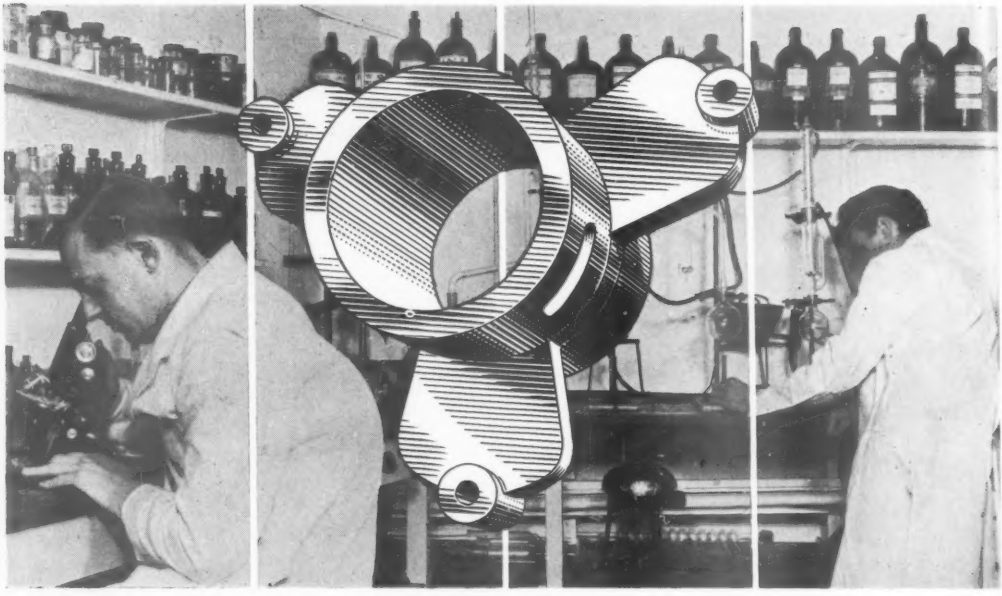

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EIGHT MATHEWS & YATES "Cyclone" paddle blade fans size PB8, duty 2,000/8,000 c.f.m., 1 in./7 in. water gauge.
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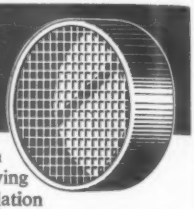

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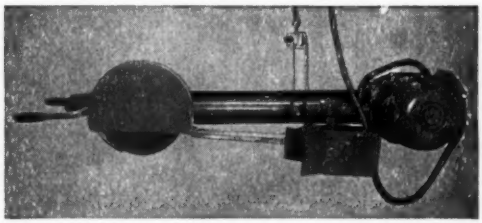

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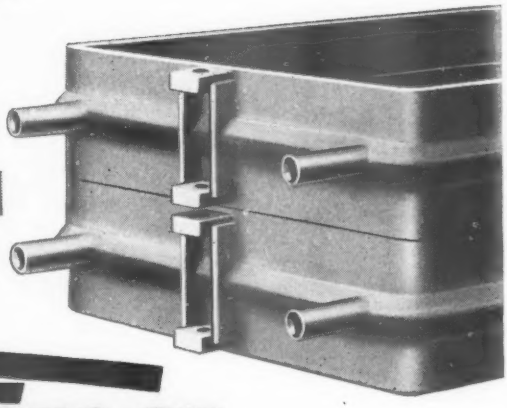

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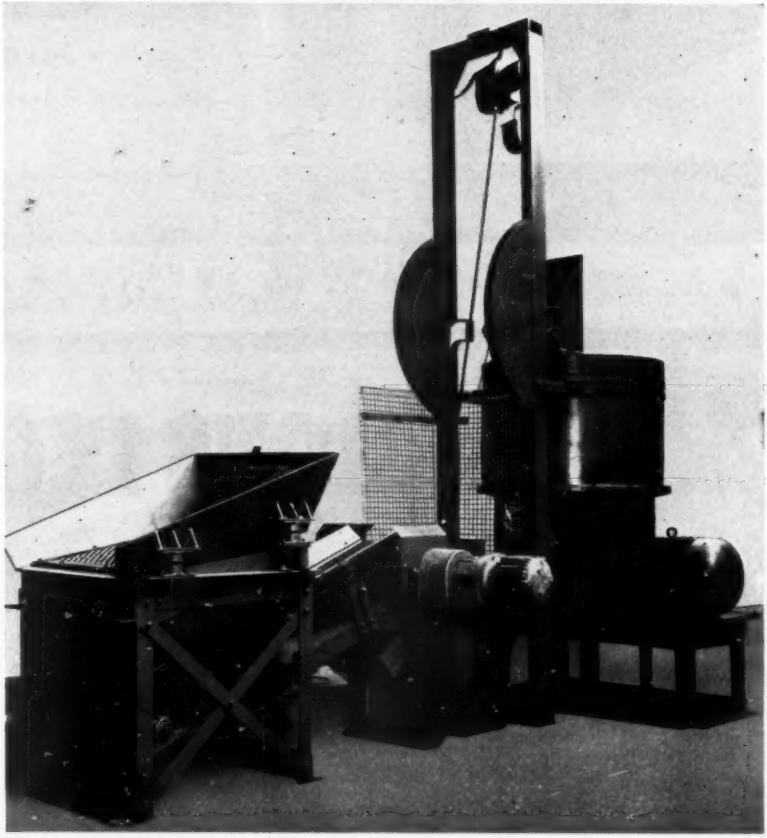

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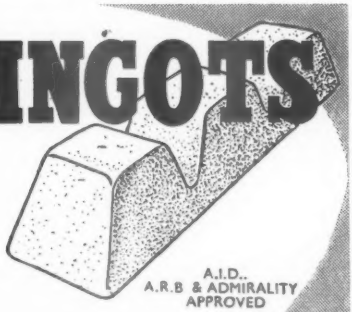

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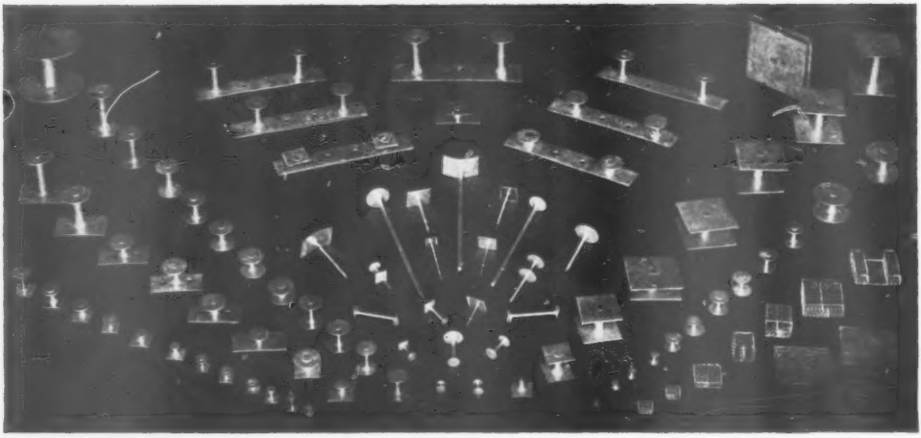

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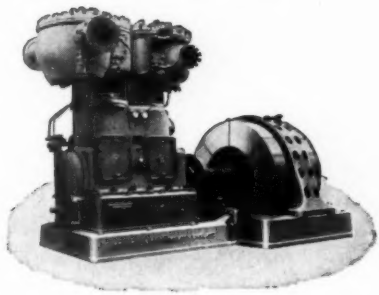

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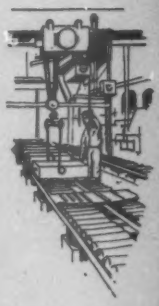

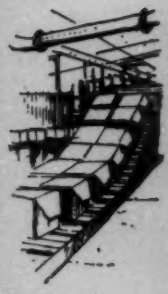

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P.9717

FOUNDRY TRADE JOURNAL

EST. 1902

VOL. 107
No. 2247
Registered at the G.P.O. as a Newspaper

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

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